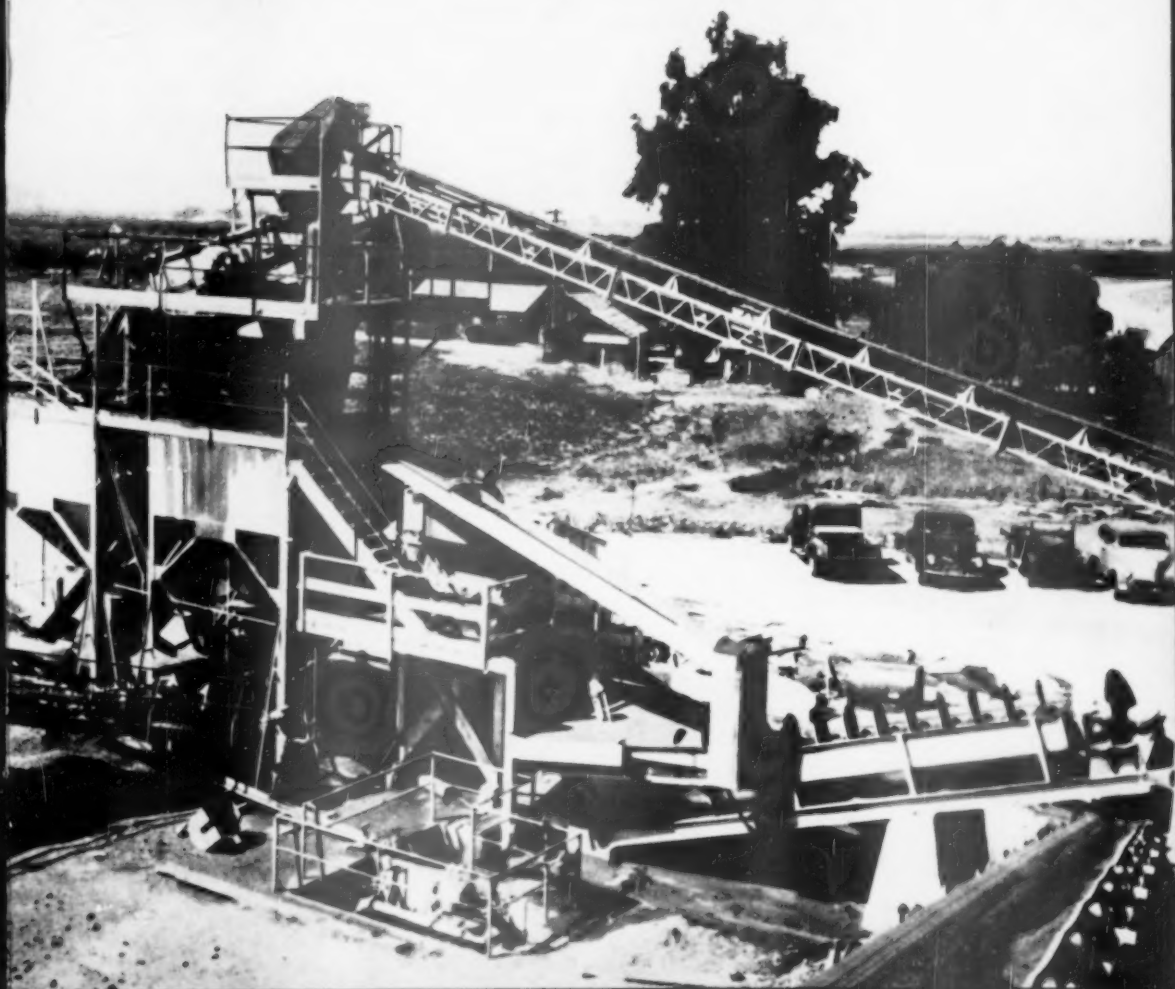


THE INDUSTRY'S RECOGNIZED AUTHORITY

# ROCK PRODUCTS

MAY 1950

LARGEST PRODUCER CIRCULATION IN THE HISTORY OF THE FIELD



Final screening section, Inland Aggregates Co., Inc., Niles, Calif.

# **WILLIAMS** **HAMMERMILLS** *for the ~~old~~ <sup>new</sup>* **1-2-3 PUNCH** in the **CRUSHED STONE FIELD**

You save operating costs because stone is crushed to desired size in one operation ... You save installation cost because you eliminate the need for additional machinery, foundations, conveyors, power drives and buildings.

## **WILLIAMS ALSO MAKES . . .**

Impact and Roller Mills for 200 to 325 mesh grinding; drier mills; air separators; vibrating screens; steel bins; complete "packaged" crushing and grinding plants.

## **USE OUR FREE TESTING LABORATORY**

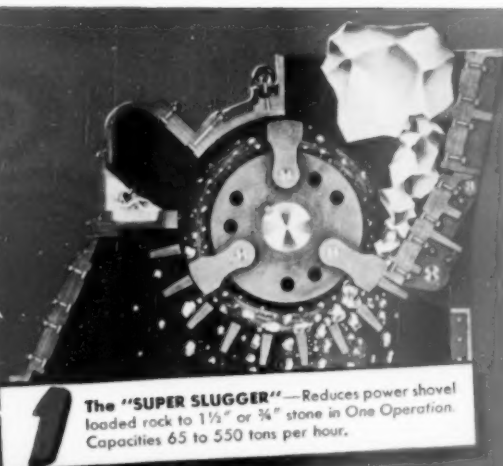


Submit your grinding problems to Williams. A sample of the material and description of the desired result will set our facilities to work on a solution to your problem. Visits during test runs and technical consultations are invited.

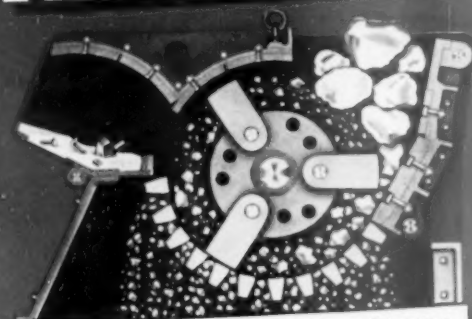
**WILLIAMS PATENT CRUSHER & PULVERIZER CO.**  
800 St. Louis Avenue

St. Louis 6, Mo.

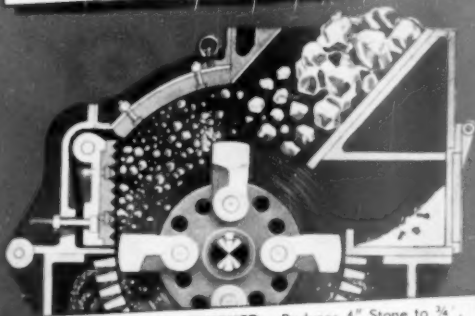
WILLIAMS



**1** The "SUPER SLUGGER"—Reduces power shovel loaded rock to 1½" or ¾" stone in One Operation. Capacities 65 to 550 tons per hour.



**2** The "SLUGGER"—Reduces "one-man" size stone (75 to 100 lb. pieces) to 1½", ¾" or Agricultural Limestone in One Operation. Capacities 4 to 100 tons per hour.



**3** The "NF" CRUSHER—Reduces 4" Stone to ¾", ½" or Agricultural Limestone in One Operation. Made in a large range of sizes with capacities from 5 to 200 tons per hour.

# **WILLIAMS**

**CRUSHERS**

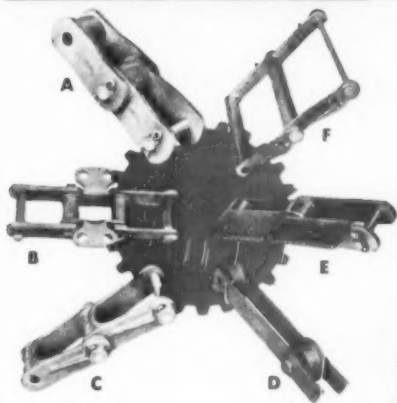
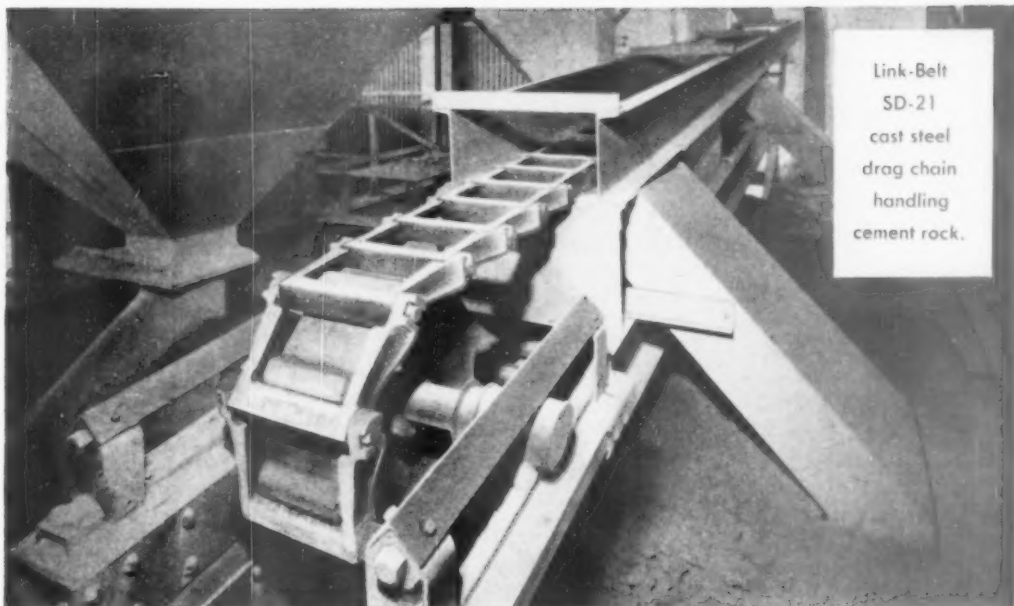
**GRINDERS**

**SHREDDERS**

**OLDEST AND LARGEST MANUFACTURER OF HAMMERMILLS IN THE WORLD**







Above: Some of the many standard types . . . A) Class 55 bushed roller chain with offset sidebars. B) Class C combination chain. C) Class 800 lev-bushed chain. D) Class 55 bushed roller chain, long pitch. E) Class 55 bushed roller chain with straight sidebars. F) Class H drag chain.

LINK-BELT Cut and Cast-tooth Sprocket Wheels for every chain service. Made in various metals and are available from stock. Section of FLINT-RIM Sprocket, made by special process, shows depth of hard chilled wearing surface for longer service.



## Solve your drive, conveyor and elevator problems with **LINK-BELT CHAINS**

That the service is unusually severe in the sand, gravel, stone and cement industries is another reason for specifying Link-Belt malleable iron, Promal and steel chains and sprocket wheels for original equipment and replacements. They are made in a complete range of standard sizes and types.

Link-Belt designs and builds a complete line of equipment for the handling and preparation of non-metallic minerals including washers, classifiers, elevators and conveyors, screens, sand separators, enclosed gear drives, bearings and other components. Send for Book No. 2126.

### LINK-BELT COMPANY

Chicago 9, Indianapolis 6, Philadelphia 20, Atlanta, Houston 1, Minneapolis 5, San Francisco 24, Los Angeles 33, Seattle 4, Toronto 8  
Offices in Principal Cities.

11-000



**LINK-BELT**  
*Chains and Sprockets*





**Bror Nordberg**  
Editor

**Nathan C. Rockwood**  
Editorial Consultant

## This Month

<b>We Hear</b>	37
<b>Editorial—Depreciation and Cost of Plant Replacement</b>	45
<b>Rocky's Notes—Review of Long-Time Concrete Experience</b>	47
<b>Labor Relations Trends</b>	49
<b>The Personal Side of the News</b>	51
<b>Industry News</b>	55
<b>Hints and Helps</b>	58
<b>New Machinery</b>	60
<b>Practical Aspects of Instrumentation</b>	
Warner Co. considered all angles including human factors before installing a central instrument and control board on lime kiln <i>Irving Warner</i>	64
<b>Gravity Operation in Sand Production</b>	
Amico Sand and Gravel Co., Morrisville, Penn., utilizes overhead rotary scrubber, sand washer; all sand recovery equipment rests on ground	66
<b>Physical Properties of Calcined Gypsum</b>	
Theoretical work on the system $\text{CaSO}_4 \cdot \text{H}_2\text{O}$ involving specific heat measurements, heat of hydration, thermodynamic data, dissociation-equilibrium measurements and stability diagrams reviewed in terms of practical calcining. <i>W. C. Riddell</i>	68
<b>Operation of High Production Limestone Mine</b>	
Louisville Crushed Stone Co. uses small blasting charges in producing high tonnage adjacent to Louisville city limits <i>David Macine</i>	72
<b>Haulage by Rail and Rubber Tires</b>	75
<b>Producing Silica for Foundries</b>	76
<b>Cement Production in Japan</b>	
Occupation policies and results of war-time damage have limited production in face of heavy demands for construction in the years ahead <i>Joseph Z. Roday</i>	78
<b>Air Receiver Explosions Reappraised</b>	82
<b>Aged Linseed Oil as Dispersing Agent in Portland Cement Analyses</b>	
Research proves advantage of aged linseed oil over oleic acid in turbidimetric determination of portland cement specific surface <i>W. J. McCoy and A. G. Caldwell</i>	84
<b>Control of Dust by Water Vapor</b>	86
<b>More on Firing Anthracite Coal</b>	88
<b>Small Producer Rebuilds to Improve Aggregate Quality</b>	89
<b>Expanding Perlite in Vertical Furnace</b>	91
<b>Diversification to the "Nth" Degree</b>	93
<b>Aggregates from Mine Waste</b>	
Pennsylvania Aggregates, Inc., processes tailings from worked out iron mine into aggregates suitable for Pennsylvania Turnpike extension <i>Walter S. Lenhart</i>	94
<b>Lightweight Aggregates from Phosphate Slimes</b>	
R. C. Specht and W. E. Horron, Jr. <i>David Macine</i>	96
<b>A Single Crusher Limestone Plant</b>	98
<b>Manufacture of Precast Wall Sections</b>	
<i>Norman D. Nichols</i>	127
<b>Simplified Method for Measuring Consistency of Concrete</b>	130
<i>J. W. Kelly and Norman E. Haavik</i>	
<b>Midwest Ready-Mixed Concrete Producers Meet in Chicago</b>	132

**Walter S. Lenhart**, Associate Editor  
**David Macine**, Associate Editor  
**L. David Minsk**, Associate Editor  
**M. K. Smith**, Assistant Editor  
**J. Sedlack**, Assistant Editor

### Contributing Editors

**Victor J. Azbe**  
**Dr. F. O. Anderegg**  
**M. W. Loving**  
**James A. Barr, Jr.**

### Home Office

**Morgan K. Cottingham**, Ad. Manager  
**H. M. Goodenow**, Dir. of Circulation  
**Mary A. Whalen**, Circulation Service  
**M. S. Hendricks**, Dir. of Research  
**C. M. Hancock**, Production Manager  
**C. P. Teets**, Field Representative

### District Offices

**Eastern Area**—**Richard Y. Fuller**, Manager; **John F. Lockitt**, Assistant, 522 Fifth Ave., New York 18, Tel. Murray Hill 2-7888.

**Central Area**—**R. P. Keine**, Manager, Hanna Bldg., Cleveland 15, Tel. Main 1-4362.

**Midwest Area**—**E. H. Hickey**, Representative, 309 W. Jackson Blvd., Chicago 6, Tel. Harrison 7-7890.

**Western Area**—**L. C. Thawn**, Manager, 309 West Jackson Blvd., Chicago 6, Tel. Harrison 7-7890.

**Pacific Area**—**Duncan Scott & Co.**, Mills Bldg., San Francisco 4, Tel. Garfield 1-7950. In Los Angeles 5, 2978 Wilshire Blvd., Tel. Dunkirk 8-4151.

**London, England**—**Harold F. Charles**, Managing Director, Maclean-Hunter, Ltd., Sun Life of Canada Bldg., Trafalgar Square, London, S.W.1.

ROCK PRODUCTS is published monthly by MACLEAN-HUNTER Publishing Corporation, 309 West Jackson Blvd., Chicago 6, Illinois; Horace T. Hunter, President; E. R. Gauley, Vice President; J. L. Frazier, Secretary. Copyright, 1950. Entered as second-class matter, Jan. 30, 1936, at the Chicago, Ill. post office under the act of Mar. 3, 1879. Additional entry at Milwaukee, Wis. ROCK PRODUCTS is indexed regularly by Engineering Index, Inc.

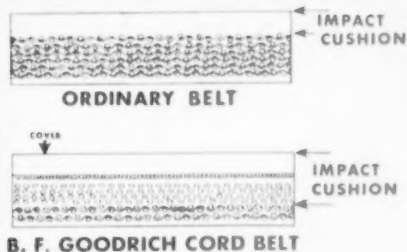
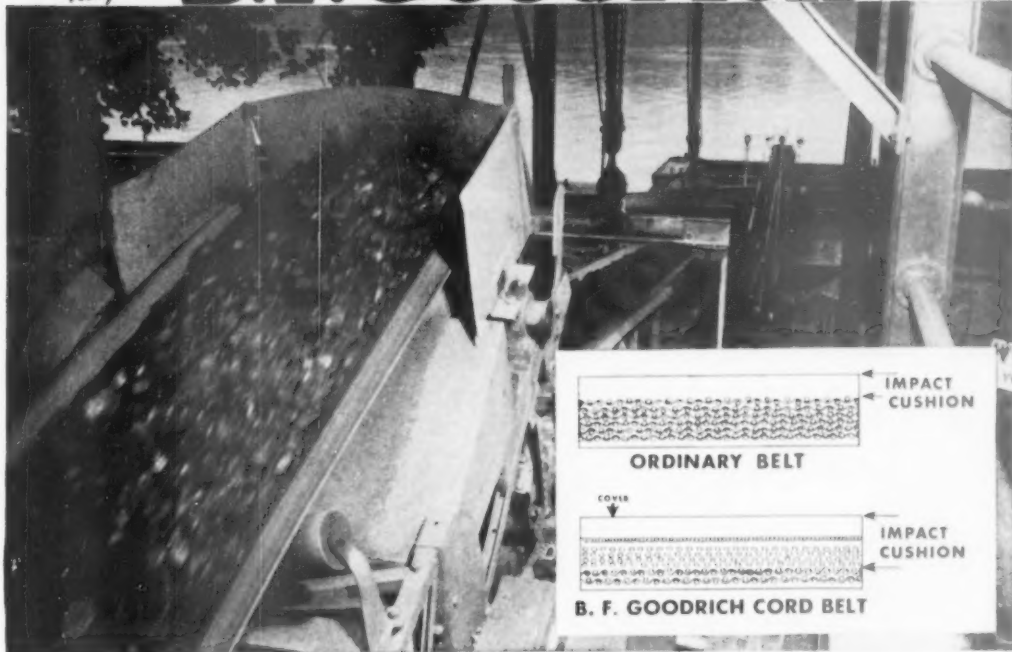
### SUBSCRIPTION INFORMATION

Subscription Price: United States and Possessions, Canada one year, \$2.00; two years, \$3.00; three years, \$4.00. Pan American, one year, \$4.00; two years, \$7.00; three years, \$10.00. All other foreign, one year, \$6.00; two years, \$12.00; three years, \$15.00. Twenty-five cents for single copies, indexed in the Industrial Arts Index. Canadian subscriptions and remittances may be sent in Canadian funds to ROCK PRODUCTS, P. O. Box 100, Terminal "A," Toronto, Canada. To Subscribers—Date on wrapper indicates issue with which your subscription expires. In writing to have address changed, give old as well as new address.

Research  
keeps

# B.F. Goodrich

first in  
rubber



## Cord belt stands rushing grit; lasts 5 times longer than previous belts

*B. F. Goodrich belt saves 50 man-days of labor  
in track-to-river installation*

THE coal here travels from freight cars to river barges, riding the length of one belt, dropping six feet to the next, and so on down the "stair-case". The stream of pulverized coal is constant, speed of the belt is usually 450 feet per minute, carrying about 450 short tons per hour, 500,000 tons a year.

Ordinary belts wore out in a year, sometimes sooner. B. F. Goodrich Cord belts were installed. The oldest is still in service after 5 years, delivering 2,500,000 tons, as against 500,000 for ordinary belts. At least 50 man-days of labor have been saved—time that would have been spent repairing and replacing ordinary belts. Here's why the B. F. Goodrich Cord belts give this kind of service:

**Impact Resistance**—Each lengthwise

cord is completely surrounded and cushioned by rubber; all the rubber forms one connected mass. This rubber-borne cord body has virtually the same impact resistance as the cover itself. Cords are free to "give" when impact occurs. It distorts temporarily, distributing and absorbing a shock that would damage stiff unyielding plies. In addition to the regular cord body, B. F. Goodrich has added a patented *Transcord Breaker*—an extra layer of parallel cords in rubber, placed across belt width. Acts as a shock absorber; stretches to prevent gouges and cuts from splitting belt cover. B. F. Goodrich Cord belt has 2 to 6 times the impact resistance of ordinary belts.

**Troughing**—There being no crossweave in the cord plies, cords are free to flex, conform to idlers, pulleys. No spillage.

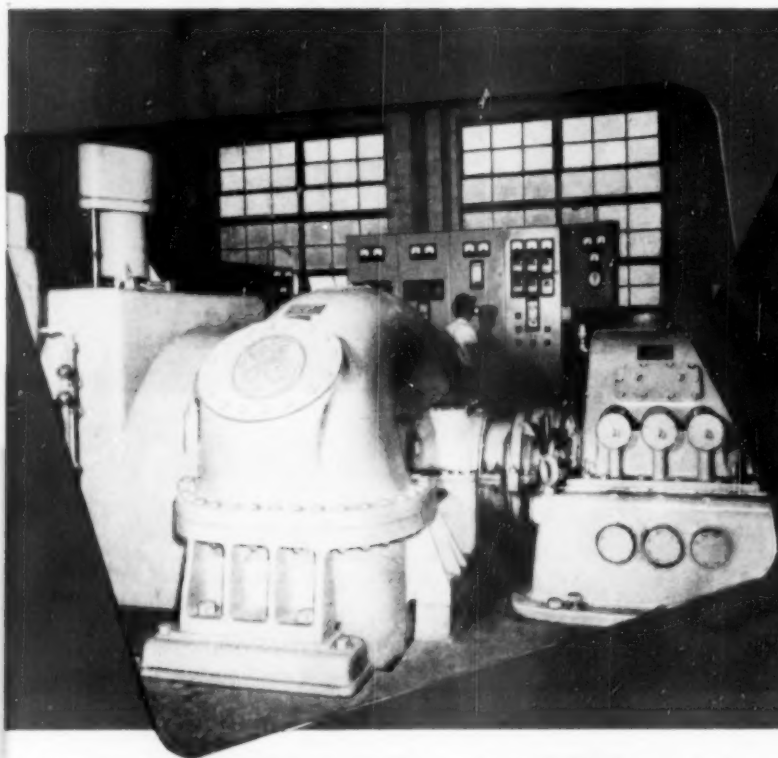
Troughs naturally even when running empty.

**Adhesion**—Ply separation in a B. F. Goodrich Cord belt is practically impossible. Rubber-surrounded cords make one integral piece of rubber.

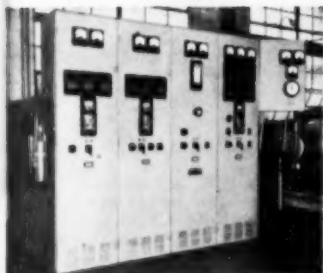
**Moisture and Acid Resistance**—Cords are twisted tighter than ordinary yarn, not susceptible to moisture. Rubber-surrounded cords keep out air, dampness, prevent mildew.

The first B. F. Goodrich Cord belt ever made is still on the job after 12 years and over 14 million tons of rough-riding coal. If you're looking for similar savings in coal-hauling, call in your local BFG distributor, or write The B. F. Goodrich Company, Industrial and General Products Division, Akron, Ohio.

Conveyor Belts BY  
**B.F. Goodrich**



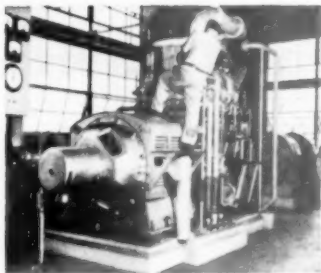
This new G-E steam turbine supplies power for Medusa's entire Bay Bridge plant and the community of Bay Bridge as well. Rated 3000 kw, 3600 rpm, 200 psi pressure, it is connected through a speed reducer to a G-E a-c generator rated 3750 kva, 750 rpm, 2400 volts. Precision-built G-E turbine-generators provide high thermal efficiency.



2 For the power distribution system, the plant uses this G-E 2400-volt Type M1-6 Metal-Clad switchgear, a co-ordinated, easily-installed unit, completely metal-enclosed for personnel safety. G-E Metal-Clad switchgear, in a wide range of ratings, contains incoming line and feeder breakers that insure adequate interrupting capacity.



3 This 7-panel G-E Limitamp high-voltage motor control line-up controls five 200 hp motors in the dry-grind tube mills and two 300 hp motors for the pulverizers. Elsewhere, a 750-kva G-E unit substation steps down 2400-volt power to 480 volts for small-motor and lighting use. G-E unit substations minimize voltage drop.



4 For emergencies, additional standby capacity is provided by two 375-kva diesel engine-driven G-E generators (one shown), each with a 5-kw exciter. Use of many thousand feet of G-E interlocked armor cable throughout the plant for power and control leads eliminated the need for costly conduit installations.

*You can put your confidence in—*

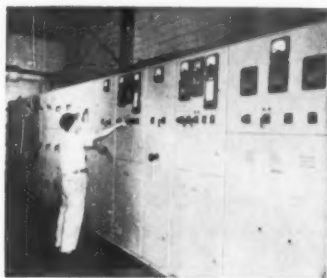
**GENERAL**



**ELECTRIC**

658-2

# MEDUSA INSTALLS NEW POWER PLANT- CUTS FUEL COST!



5 Another G-E switchgear unit combined with Cabinetrol® is used in conjunction with two standby generators as well as a bank of 1500-kva transformers. Combining simplicity and convenience, Cabinetrol centralizes in one location the control of a number of 15 to 50-hp motors that are used in the plant in crushing and grinding operations.

*Now is the time—when you are in the planning stage for plant improvement—to call in a G-E specialist in cement mill electrification.*

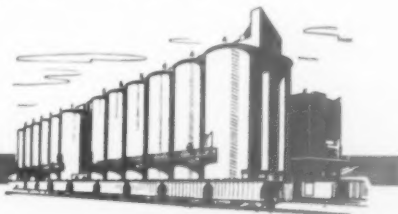
**General Electric Turbine-Generator at Bay Bridge mill utilizes waste-heat steam more efficiently—eliminates coal-firing of two boilers—supplies power for five kilns and all other plant equipment on waste heat alone!**

To reduce excessive operating and maintenance costs, the Medusa Portland Cement Company recently replaced the power generating system at its Bay Bridge, Ohio, plant with a completely new "packaged" General Electric system, including a turbine-generator and allied equipment.

Previously, four kilns and attendant equipment were powered by the old turbine using steam delivered by four boilers, two using waste heat and two coal-fired. Now, with the installation of the more efficient G-E turbine equipment, the entire plant operates on power generated from waste heat alone. Coal-fired boilers are eliminated, fuel costs are reduced!

Complete with co-ordinated G-E equipment for power distribution and control, the Medusa installation is another example of how well a G-E "packaged" electrical system pays off.

You, too, can cut operating and maintenance costs all along the line by consulting an experienced G-E engineer on your electrical problems. *Apparatus Department, General Electric Company, Schenectady 5, N. Y.*





# The Work Horse in the packaging field

## BEMIS MULTIWALL PAPER SHIPPING SACKS



They're tough and sturdy... have plenty of reserve strength even when packed with such heavyweights as cement or fertilizer.

Bemis uses top quality kraft paper. Each of the three or more plies has been tested for the kind of work it must do. So, there is never any question. It's sure to do the job.

Seven Bemis Multiwall Plants are ready to team up to give you service in an emergency or to provide a dependable source of supply.

# Bemis



Atlanta, Ga. • Buffalo, N.Y. • Houston, Texas  
East Pepperell, Mass. • San Francisco, Calif.  
Vancouver, Wash. • Wilmington, Del.

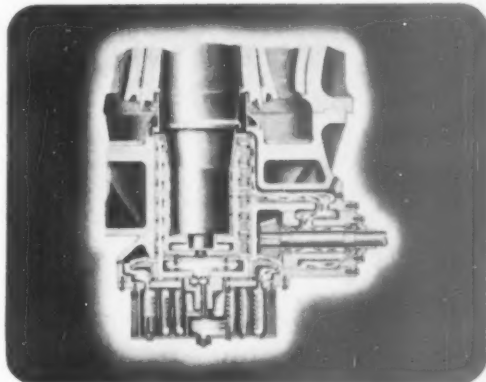
Baltimore • Boise • Boston • Brooklyn • Dallas • Chicago  
Cleveland • Cleveland • Denver • Detroit • Evansville, Ind.  
Hartford • Kansas City • Los Angeles • Louisville  
Memphis • Minneapolis • New Orleans • New York City  
Portland • St. Louis • St. Paul • Salt Lake City • Seattle • Spokane

# First Choice

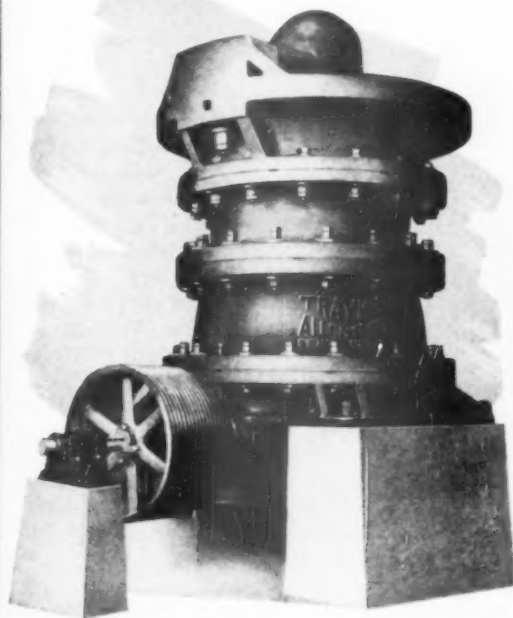
when Huge Tonnage is a Primary Problem

Many plants of less than 10,000 tons daily capacity, and all larger plants, will operate with greater efficiency using a Traylor Gyratory Crusher for primary breaking. That's because of its very large capacity in relation to power required.

But, tremendous capacity is not the only advantage of the Traylor Gyratory Crusher. The receiving openings of all models are ample. This teams them efficiently with all large capacity material handling equipment. Operated at, or near, capacity, the power they use is extremely low per ton. Simple design and superb construction reduce maintenance... assure long, trouble-free operation.



Among the features of these fine crushers is a positive, automatic, pressure-feed lubrication system. Every moment of operation the full length of the eccentric bearing and the main pinion are bathed in cooled oil from a generous reservoir kept dust-free with Traylor's exclusive, effective dust seal.



Bulletin 4100 contains a complete description and pictures of the Traylor Gyratory Crusher as well as basic tables and information to help you make your selection of a crusher on the basis of best operating practice. Write for your copy today.

**TRAYLOR ENGINEERING & MANUFACTURING CO.**  
146 Mill St., Allentown, Pa.

Sales Offices: New York, N. Y., Chicago, Ill., Los Angeles, Calif.  
Canadian Mfrs: Canadian Vickers, Ltd., Montreal, P. Q.

# Traylor

Rotary Kilns, Coolers and Dryers  
Grinding Mills • Crushing Rolls  
Jaw, Reduction and Gyratory Crushers

A "TRAYLOR" LEADS TO GREATER PROFITS

# Performance in the Pits by **INTERNATIONAL**



**"POWER ON WHEELS"**



**"POWER ON TRACKS"**

Clay from the pit rolls to the brick plant behind an International ID-9 wheel tractor. Teamed with a 4-yard wheel scraper, the ID-9 moves the clay over 1,000 yard hauls swiftly and at low cost for the Roanoke-Webster Brick Company of Roanoke, Va. The ID-9's performance proves that International "Power on Wheels" pays off in production.

Across the nation, near Vaughn, Montana, an International TD-9—rugged "Power on Tracks"—with a matched front-end loader, works for quarry-owner Walter Sack. The compact, maneuverable TD-9 loads crushed and washed rock from stockpiles into trucks at the rate of 100 tons per hour.

"Our truckers say this is the best outfit that ever put on a load for them. We agree. This little unit is just that," says Mr. Sack.

Whether it's crawlers, wheel tractors or power units, your International Industrial Power Distributor can furnish you with power that will more than pay off in productive work. See him now for International "Power on Wheels," "Power on Tracks," and "Power on The Job," with diesel or carbureted engines.

**INTERNATIONAL HARVESTER COMPANY**  
Chicago

*True in  
James Melton and "Harvest of Stars"  
—NBC, Sunday afternoons.*

CRAWLER TRACTORS  
WHEEL TRACTORS  
DIESEL ENGINES  
POWER UNITS



## **INTERNATIONAL INDUSTRIAL POWER**



## for rock-bottom economy



**G**ET the tire that's odds-on favorite with rock haulers everywhere—Goodyear's Hard Rock Lug. It's so tough you can't beat it for stamina and mileage on tire-killing rock work. Like all Goodyear work tires, the Hard Rock Lug is job-designed for maximum performance on a particular hauling job. Its carcass is extra-tough, is protected against bruising by an extra-thick undertread—big, tough lug bars armor its tread and sidewalls against cuts and rips—it provides positive traction, forward or reverse, with its self-cleaning universal tread. All in all it's your best bet for cutting costs—stepping up performance. Remember, always **BUY** and **SPECIFY** Goodyear—it pays!



THE HARD ROCK RIB

THE ROAD LUG

*Companion tire for front wheels in rock work—specially designed to give you easier steering, smooth rolling, same tough body, same shoulder construction as the Hard Rock Lug.*

*Specially designed for trucks that operate both OFF and ON the road. This remarkable dual-purpose tire combines off-the-road toughness and traction with on-the-road mileage and economy.*

*First—because proved best!*

# GOODYEAR

**MORE TONS ARE HAULED ON GOODYEAR TIRES THAN ON ANY OTHER KIND**

ROCK PRODUCTS, May, 1950

# GREAT GRADERS

*...and here's the proof!*

THERE'S NO guessing about the performance of "Cat" Diesel Motor Graders with Gustafson & Reynolds, Sioux Falls, South Dakota. They know from experience these husky yellow machines really pay off in quarry operations. Ruggedly built from stem to stern, they deliver 60-minute production hours day after day under grueling conditions.

Here you see a, "Cat" Diesel No. 12 Motor Grader busy stock-piling gravel near Sturgis for this outfit. Working in second gear on grades as steep as 15%, it handles 2000 yards of gravel per 10½-hour day. The pile is 15 ft. high by 300 ft. long. There's horsepower aplenty in the No. 12 to take this task in stride, as well as to "double in brass" on road construction and road

graveling. From crusher to roadbed, it's an efficient, economical tool to get work done—and it rates high both with owners and operators. Chet Heisler, operator, says: "Stock-piling gravel is never a very easy job with a grader, but the No. 12 handles the job very nicely with a reasonable fuel cost."

Whatever the grading job, there's a "Cat" Diesel Motor Grader the right size to do it most profitably for you. And there's a capable "Caterpillar" dealer near-by who's ready round-the-clock to give you "Johnny-on-the-spot" service. He sincerely believes this rugged yellow machine is the best in the field. Ask him for full proof of its performance!

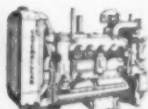
CATERPILLAR TRACTOR CO. • PEORIA, ILLINOIS



Only "Caterpillar" designs and builds every part of the famous "Cat" Motor Graders. This undivided responsibility is your assurance of a long life of efficient, economical performance.



Each of the 3 sizes of "Cat" Motor Graders is a completely different machine. There's no performance penalty due to excessive frame weight, too little power or poorly matched working parts.



Only "Caterpillar" Motor Graders have the dependable yellow engines—the power plants that are world famous for delivering 60-minute-hour performance every hour day in and day out.



Lubricating oil is cooled in this radiator section to minimize carbon lacquer and gum formations—enemies of long engine life. Lower temperatures preserve the lubricating qualities of the oil.



Safe and sure Diesel starts are assured by this electrically started gasoline engine. It warms the coolant and allows the Diesel to circulate "lube" oil before actual starting.



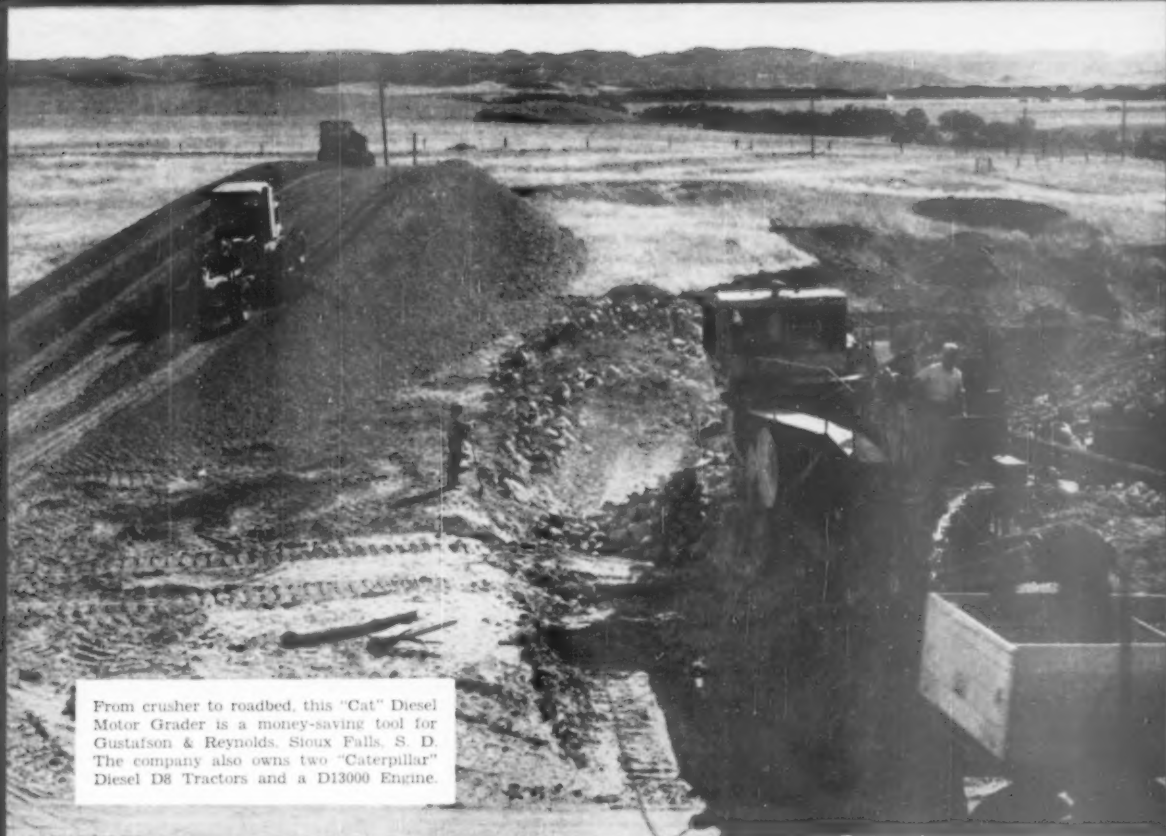
Castings like this cylinder head on "Cat" Diesels are made right in "Caterpillar's" own foundry, where tolerances and quality can be closely controlled—another example of precision engineering!

# CATERPILLAR

REG. U. S. PAT. OFF.

ENGINES • TRACTORS • MOTOR GRADERS





From crusher to roadbed, this "Cat" Diesel Motor Grader is a money-saving tool for Gustafson & Reynolds, Sioux Falls, S. D. The company also owns two "Caterpillar" Diesel D8 Tractors and a D13000 Engine.



Typical of "Caterpillar" quality are these aluminum alloy pistons. Tops are oil sprayed for coolness and long life. Cast iron compression-ring belt keeps this vital ring working at top efficiency.



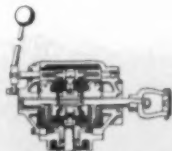
"Caterpillar"-built fuel injection equipment is trouble-free and fool-proof. Injection capsules and pumps can be replaced on the spot in the field — no adjustments are necessary.



Exclusively "Caterpillar," these solid aluminum "con" rod bearings give low rate of wear, ability to carry heavier loads, exceptional heat transfer characteristics and high corrosion resistance.



"Caterpillar" Motor Graders are designed for exceptionally good operator visibility. Sitting down, the operator can see toe and heel of the blade with equal ease. That helps keep jobs moving.



Mechanically operated controls give the user the constant control that is so necessary for precision work. They're quality built — changes in temperature do not affect them.



"Caterpillar's" exclusive side-shift mechanism allows extreme blade positions without the need for manual adjustment of linkage. You'll find this a real work- and time-saver on the job.

# DIESEL

**EARTHMOVING EQUIPMENT**

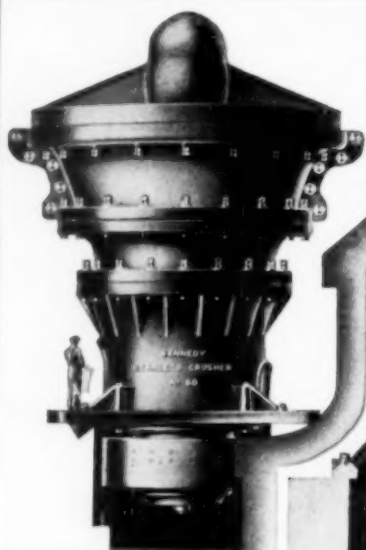
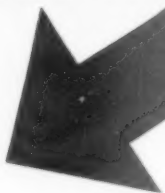
**Ask your dealer for a demonstration!**  
**Ask him for a showing of the new**  
**film, "Better Blading"!**



LET'S

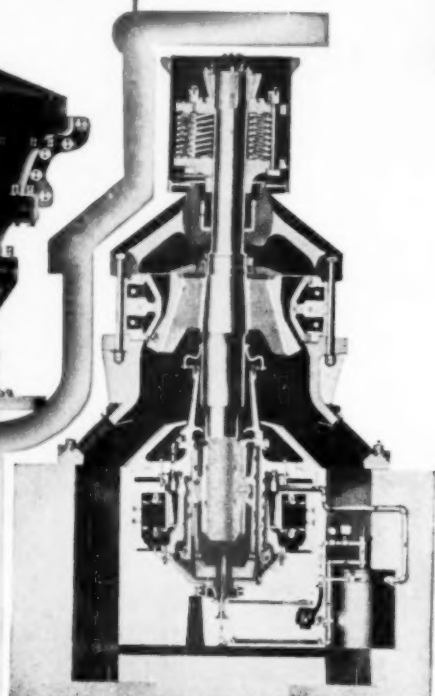
TALK ABOUT A REAL CRUSHER

It's Rugged!



Primary Crusher

ROLLER BEARING  
GEARLESS GYRATORY  
CRUSHERS



Secondary Crusher

- ① Synchronous motor built into pulley assembly
- 
- ② Power applied ONLY for crushing
- 
- ③ Force-feed lubrication
- 
- ④ No gears to waste power
- 
- ⑤ Added power at no added cost
- 
- ⑥ Quiet — smooth Frictionless action
- 
- ⑦ Varying capacities to serve every purpose

Designed and built to produce, economically and consistently, maximum loads of uniform products. Assures efficient service with minimum "time off for repairs" under the most severe operating conditions.

Costs less in the long run because it has a larger capacity; uses less power; holds repair bills to a

minimum; produces more and better rock tonnage, faster and at lower cost.

Kennedy Crushers are made in various size units delivering from 12 to 3600 tons per hour. Engineered to serve your exact needs. Fifty years experience in the building of heavy duty crushers is your assurance that "It Costs Less To Own The Best" so use KVS equipment.

Send for bulletins describing, fully, all types of KVS crushers

**KENNEDY-VAN SAUN MFG. & ENG. CORPORATION**

TWO PARK AVENUE, NEW YORK 16, N. Y.

## For power, for value, for every job THEY'RE GREATER THAN EVER

Year after year the nation's truck users buy more Chevrolet trucks than any other make. For every kind of trucking job they prefer Chevrolet power and Chevrolet value.

Now, Chevrolet's two rugged valve-in-head engines give more power than ever. Advance design, solid construction and low prices give Chevrolet more value than ever.

Prove it to yourself. See the new Chevrolet P-L Trucks. Check them for popularity, performance, payload and price. In 1950 they are more than ever America's best truck buy!

CHEVROLET MOTOR DIVISION, General Motors Corporation, DETROIT 2, MICH.

### LEADING WITH ALL THESE PLUS FEATURES:

- TWO GREAT VALVE-IN-HEAD ENGINES: the New 105-h.p. Load-Master and the Improved 92-h.p. Thrift-Master—to give you greater power per gallon, lower cost per load • THE NEW POWER-JET CARBURETOR: smoother, quicker acceleration response • DIAPHRAGM SPRING CLUTCH for easy action engagement • SYNCHROMESH TRANSMISSIONS for fast, smooth shifting • HYPOID REAR AXLES—5 times more durable than spiral bevel type • DOUBLE-ARTICULATED BRAKES—for complete driver control • WIDE-BASE WHEELS for increased tire mileage • ADVANCE-DESIGN STYLING with the "Cab that Breathes" • BALL-TYPE STEERING for easier handling • UNIT-DESIGN BODIES—precision built.



# P\*L\*

### ADVANCE-DESIGN TRUCKS

#### P\*Popularity L\*Leaders

Chevrolet trucks outsell all others. In every postwar year truck users have bought more Chevrolets than any other make—proof of the owner satisfaction they have earned throughout the years.

#### P\*Performance L\*Leaders

The new Chevrolet P-L trucks give you high pulling power over a wide range of usable road speeds—and on the straightaway, high acceleration to cut down total trip time.

#### P\*Payload L\*Leaders

The rugged construction and all-around economy of Chevrolet P-L trucks cut operating and repair costs—let you deliver the goods with real reductions in cost per ton per mile.

#### P\*Price L\*Leaders

From low selling price to high resale value, you're money ahead with Chevrolet trucks. Chevrolet's rock-bottom initial cost—outstandingly low cost of operation and upkeep—and high trade-in value, all add up to the lowest price for you.



# Horner and Switzer

## move 220,000 with 3 rear-dump

220,000 yards of mountain-top granite . . . altitudes up to 8300 feet . . . narrow, precipitous haul trails . . . and continual heavy rains, almost every other day. Those were the conditions which Contractors Horner & Switzer tackled on relocation of U. S. Hwy. 280, from Granby Dam to Monarch Lake, Colorado. They drove in a fleet of 3 LeTourneau rear-dump Tournarockers, teamed them up with a 2½-yard rock shovel, and got the following big-yardage results:

### Averaged 10½ bank yds. per load

Contractor's crew estimated the rock wagons carried 10½ bank yards of granite each trip. They were loaded in an average of 7 passes from the 2½-yard dipper. In extreme hard digging, it often took the shovel 4½ minutes to load each rig. Haul cycles were so fast that on most haul distances only 2 of the Tournarockers were needed to keep the shovel busy. For example:

### 1240' haul, dump, return in 4¼ min.

Hauls on the job ranged from a few feet up to a half-mile. Checked on a 1240-foot, one-way haul, including a 170-foot stretch of 13% adverse grade, each Tournarocker took only 4¼ minutes to travel, dump, and return to the shovel.

These fast cycles on the mountain-side trails were possible because Tournarocker's 4-wheel air brakes let operators haul

Dumping took only 8 seconds, with Tournarocker's powerful, fast-acting, electric body hoist. Vertical dump position and the smooth, clean, streamlined body cleared loads instantly. Power is on the Tournarocker's front wheels.

**LETOURNEAU**  
PEORIA, ILLINOIS

**TOURNAROCKERS**

HIGH SPEED on RUBBER PLUS TRACTION ADVANTAGES of a CRAWLER

# Yds. MOUNTAIN GRANITE TOURNAROCKERS

heavy loads at maximum speeds with complete safety. 4,108 square inches of braking surface . . . more on one wheel than most haulers have on all four wheels . . . gave sure, safe stops every time. Short, 90° turns, and positive electric steer by push-button control, permitted quick turning and spotting on the dump and at the shovel.

## 8-second dump

Dump was fast . . . simple, electric body hoist tilted the wide, streamlined body to vertical position . . . cleared the 10½-yard loads in just 8 seconds, total hoist and dump time. Because of their front-wheel drive, and holding action of powerful 4-wheel brakes, the Tournarockers safely backed up to edge of bank, and dumped loads over the bank eliminating rehandling . . . saving dozer clean-up.

All these Tournarocker advantages for big-payload, fast-cycle hauling gave Horner & Switzer the lowest-cost answer on their tough mountain highway job. What's more, they drove their big 16-ton capacity rigs to the job from Denver . . . made the 120-mile trip, via the Berthoud Pass, in less than a day.

If you haven't checked the new, low hauling costs possible on your work with these revolutionary rear-dump Tournarockers, better get all the facts from your LeTourneau Distributor right away. Write or call him NOW!

Big 11'2" x 7'10" top opening, plus low body position, gave the shovel operator an easy-loading target. These big capacity LeTourneau rock wagons maneuvered in close . . . hauled an average load of 10½ bank yds. of granite.



Operating on narrow ledge at the shovel, Horner & Switzer's Tournarockers turned and spotted into loading position in an average of 24 seconds. Giant, 4-wheel air brakes and positive electric power steer gave operators complete confidence and safety.



Tournarocker Trademark

Townapull, Townadotter Trademark Reg. U.S. Pat. Off.

Send Today for complete facts to R. G. LeTOURNEAU, Inc., Peoria, Ill.

We're interested in . . . ☐ specifications ☐ price ☐ job analysis on the 16-ton, rear-dump, 816 Tournarocker

NAME . . . . . TITLE . . . . .

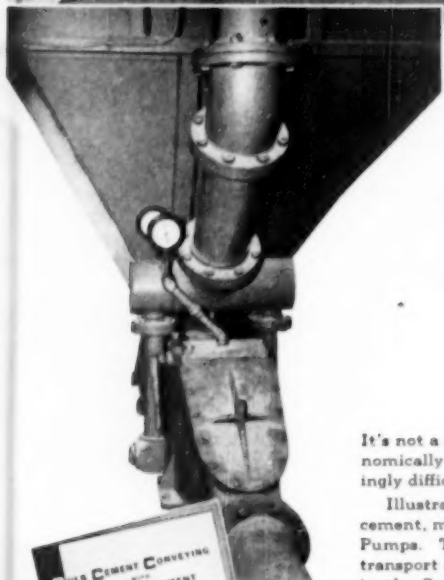
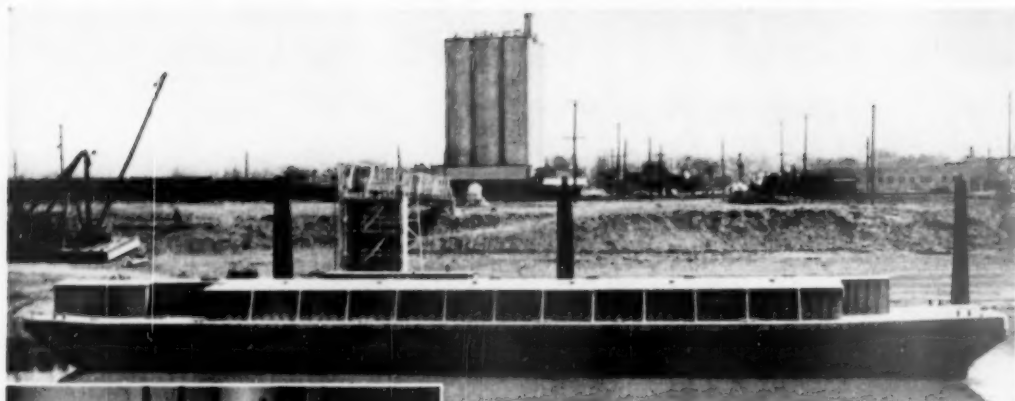
COMPANY . . . . . TYPE OF BUSINESS . . . . .

STREET . . . . . CITY . . . . . STATE . . . . .

Would also like information on ☐ 13.5-yard C Townapull ☐ 7-yard D Townapull ☐ 180 h.p., rubber-tired Super C Townadotter







Write for Bulletin FK-20A, 24 pages on how to handle bulk Portland cement with Fuller equipment.

## Conveying from Barge to Silos with **F-K** Pumps

It's not a difficult or unusual job for Fuller-Kinyon but, try and do it as economically and efficiently in any other way! Fuller-Kinyon makes the seemingly difficult and impossible easy to accomplish.

Illustrated is one method in use today for transporting bulk Portland cement, made economically possible through the application of Fuller-Kinyon Pumps. This company operates seven barges, 7500 barrels capacity each, to transport cement from its cement plant to a storage and distributing station in the South. Each barge is permanently equipped with a Fuller-Kinyon Stationary Pump, which conveys cement from barge to silos on shore at rate of 400 barrels an hour. Approximate conveying distance 1200 feet.

Convey the Fuller-Kinyon way—through pipe lines by air. Conveying lines can be placed overhead or buried underground; no bridges or monitors necessary. Will not interfere with building layout or equipment installed. In addition, cleanliness and safety for the workmen; no dust collectors necessary.

When you have a conveying problem, tell us about it. Chances are we can help. Layouts and estimates furnished without any obligation.

FULLER COMPANY, Catasauqua Pa.  
120 S. LaSalle St., Chicago 3  
420 Chancery Bldg., San Francisco 4

P-109A

# fuller

DRY MATERIAL CONVEYING SYSTEMS  
AND COOLERS—COMPRESSORS  
AND ASSOCIATED EQUIPMENT

# Barber-Greene *Photo-News*



PRINTED IN U.S.A.  
27M-AM-4-50

ON-THE-JOB VIEWS AND COST-SAVING IDEAS • VOLUME 1 • NO. 1



Extensive use of cost-reducing belt conveyors is evident in this view of Uvalde Rock Asphalt Company's plant. 850115

## MINES 6 MILES OF ROAD PER DAY

Every day from 3,000 to 4,000 tons of processed rock asphalt are produced by the Uvalde Rock Asphalt Company out in Blewett, Texas—enough to put a 1-inch top course on 6 to 7 miles of road. This impressive production achievement is made possible largely through the use of belt conveyors that handle all the material through processing operations to the various stock piles. B-G Belt Conveyors are ideally suited to this type of operation, where relocation is frequently necessary. They are easily disassembled, relocated and reassembled as conditions dictate.

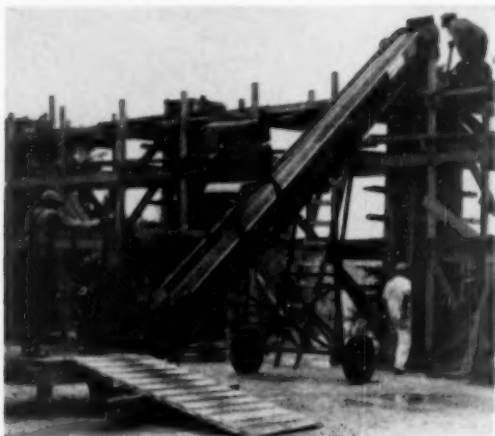


**HISTORICAL SITE FOR TURNPIKE PLANT.** A modern B-G belt conveyor system identifies Pennsylvania Aggregate's Cornwall plant which is located on famed Cornwall Banks—site of one of the world's greatest mines—oldest continuously operated in the new world. The two-century accumulation of limestone—eight million cubic yards—is being processed for use by various Turnpike contractors.



**NEW LOADER HAS LONG REACH.** Longest, highest trucks, trailers—even railroad cars—are loaded to full capacity at a 3 yd./min. clip by the B-G 543 Loader. Hydraulically controlled conveyor swivels to trim load, eliminates spillage or partly filled trucks. The 543 travels at 15 m.p.h. on its tractor-type chassis is easily convertible to a 7-11 yd./min. snow loader to give year 'round service.

## Barber-Greene Photo-News



**WET CONCRETE GETS A LIFT.** Another example of the broad variety of work that can be done by B-G portable conveyors came up on a recent H. A. Dailey Company job near St. Louis. A number of 16-foot columns were poured by Dailey's B-G portable—eliminating costly ramps and scaffolding, allowing simple buggy loading. The job was done quickly at lowest cost by this portable Barber-Greene which, incidentally, was towed all the way from Aurora, Illinois, to the job, over 250 miles. Portability like this pays off on a job after job.

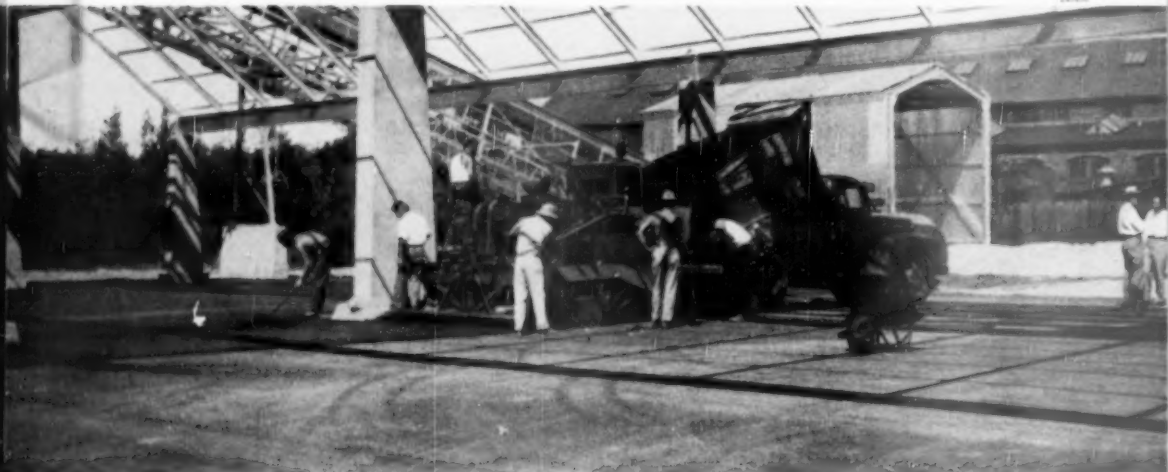


**"AT HOME" IN MIAMI SUBDIVISION.** Digging footings by hand in tough coral rock is an expensive operation that's avoided by such Florida contractors as the Clinton Construction Company in Miami. On a large subdivision project recently, all footings were dug by their B-G ditcher on an "efficient and economical" basis. Coral rock, caliche, frozen ground—even bituminous pavement—pose no problem for B-G Vertical Boom ditchers. Their "milling action" enables them to cut through toughest material, leaving a clean-bottomed, smooth wall trench.

## INSIDE JOB

By a Smooth Operator

When the state of New Hampshire decided to improve the footing and reduce adulteration by surfacing the floor in its Concord cooling base shed, a B-G finisher owned by The Manchester Sand and Gravel Company took over the job. In the shed area, which was restricted by several rows of I-beam roof supports, it maneuvered smoothly to place 500 tons of material with a minimum of hand work required for finishing. The base and binder course were laid the length of the building, and the final sheet asphalt course was laid at right angles to them. Result: a smooth, weatherproof surface at lowest cost.



*for full, fast information on any equipment*

## A NINE-YEAR-OLD MAKES GOOD IN NEW CAREER

Back in 1941 a B-G Travel Plant mixer started its working life with Rein and Schultze, Wisconsin road builders. Today, nine years and many hundreds of miles later, this original Travel Plant forms the nucleus around which the owners have built a highly efficient single aggregate plant. With a B-G Dust Collector and low pressure burner Dryer, this setup produced 120 tons of mix per hour in recent work on Wisconsin Highway 71. Future plans involve the possibility of adding a gradation unit for producing multiple aggregate hot mix. Barber-Greene long-term sturdiness combines with Barber-Greene flexibility to greatly extend and prolong the usefulness of B-G asphalt mixing equipment.



44753



**REMINDE YOU OF LAST WINTER?** Communities where snow took its toll last winter—in lost parking meter revenue, traffic and business interruptions and the like—should plan now to be ready next year to minimize these losses and to cut the cost of clearing snow quickly. The new Barber-Greene Model 544 is within the budget of small communities. It travels at 15 miles per hour—and loads up to 11 cubic yards a minute, keeps trucks on the move with a minimum of manpower. An added asset: it can be converted to an all-material, 3 yard-per-minute truck loader for summer use at little cost other than for exchanging the bucket lines. Other B-G Snow Loaders with capacities to 20 cu. yd. min.



GLOBE GAZETTE PHOTO

**NEW TWIST FOR A "GOOSENECK."** The versatility of a B-G Gooseneck Loader eliminated the need for extra investment in machinery for the Farmers Elevator Co. of Mason City, Ia. For with the problem of cutting costs in loading, unloading and reclaiming coal, they needed mechanical help in storing over 55,000 bushels of corn. Their B-G "Gooseneck," along with its coal business duties, handled this job—loading storage bins at a rate of 300 bushels in 20 minutes. The exclusive "Gooseneck" design of this Barber-Greene—which minimizes degradation when handling coal—was an asset in handling seed corn as it helped prevent damage to the kernels.

*on these pages--see your B-G Distributor*

# Barber-Greene

# Photo-News

80314



## IT'S A BRIDGE— FOR AGGREGATE ONLY

When your sand deposit is on one side of a navigable stream and your plant and railroad facilities are on the other, you have a problem similar to that one faced by Becker County Sand and Gravel Company in Fayetteville, North Carolina. Their solution: a unique bridge with 55-foot clearance carrying a 408-foot B-G belt conveyor, and another B-G conveyor that takes the sand and gravel to the washing and screening plant. Currently, this company is moving around 25 cars per day from this plant—another "special" problem solved through the use of standard, pre-engineered, easy-to-install Barber-Greene belt conveyors.



80315

**TRIPLE PLAY BY WELL-KNOWN TEAM.** From siding to silos via B-G hopper-car unloader and B-G transfer and shuttle belt conveyors is a fast, low-cost trip for materials used by Imperial Red-Mix Company in their plant at Melrose Park, Illinois. Mechanized "push button" handling with this unloading-storing team reduces the manpower requirements to a minimum.

### SERVICES THAT PAY — MORE THAN THEY COST

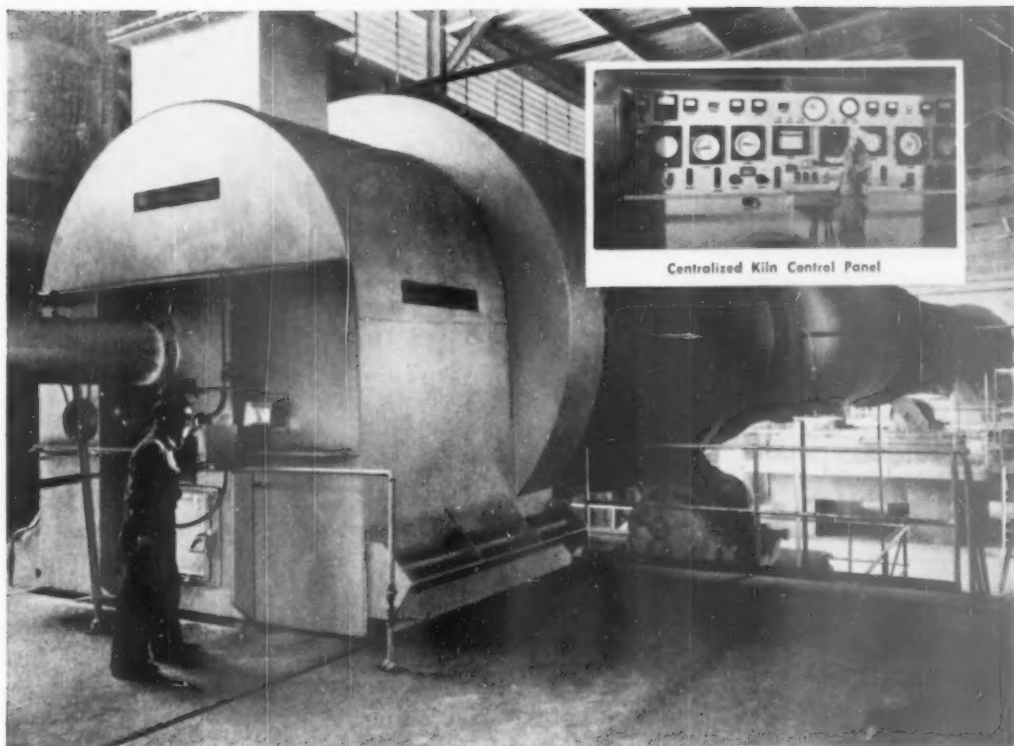
There is much for you to gain in calling upon your Barber-Greene distributor for help in solving problems involving the handling of all materials . . . mixing and placing bituminous surfacing materials . . . as well as ditching and snow removal. Your B-G distributor and his sales and service representatives have been through intensive training courses at the Barber-Greene factory. They know how to apply Barber-Greene equipment to assure the most in performance on your job—they know how to show you the best in maintenance practice. Further, your B-G distributor has service and repair part facilities you can depend upon through the years. For complete information—bulletins, specifications and prices on any or all Barber-Greene equipment—get in touch with your B-G distributor or call, write or wire directly to the address below.



## Barber-Greene Company

AURORA, ILLINOIS, U. S. A.





# Fuel Saving is Key to Low Production Costs in New 375 ft Kiln

**T**HIS NEW 11x375 ft rotary kiln was recently built and put into operation in nine months time for Dewey Portland Cement Co., Davenport, Ia. A modern, 100 barrel per hour wet process kiln, it was engineered by Allis-Chalmers to save fuel these three ways:

- ▶ Master kiln control (insert) provides fuel economy through close control. Centralized instrument panel on firing floor also results in more uniform product and increased kiln capacity.
- ▶ Heat recuperating chain system installed in feed end section of kiln utilizes more of the heat in exit gases.
- ▶ Air-quenching shaking grate type cooler returns approximately 75%

of sensible heat from discharged clinker back to kiln as pre-heated air for combustion.

The new kiln increases the production of the plant by 2400 barrels per day. Three other Allis-Chalmers rotary kilns in this plant have been in service for 22 years.

The Allis-Chalmers representative in your area can put you in touch with Allis-Chalmers rotary kiln engineering services... over 50 years of specialized experience. Call him, or write for rotary kiln Bulletin 07B6268.

**ALLIS-CHALMERS, 975A SO. 70 ST.  
MILWAUKEE, WIS.**



## ALLIS-CHALMERS

Sales Offices in Principal Cities in the U. S. A. Distributors Located Throughout the World.

*Texrope is an Allis-Chalmers trademark.*

**IT PAYS TO SPECIFY MOTORS...  
CONTROLS... V-BELT DRIVES—ALL  
FROM ALLIS-CHALMERS**



Motors—Controls



Texrope Drives



Vibrating Screens



Jaw Crushers



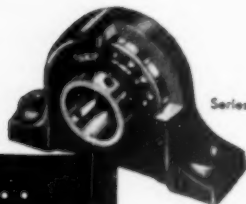
Grinding Mill



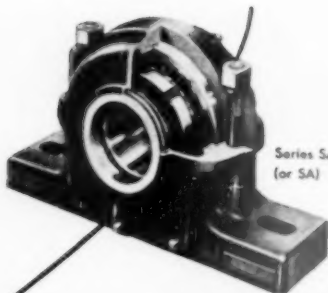
Gyratory Crushers

One for every place . . .

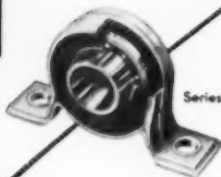
and one place to get them all



Series SUS



Series SAF  
(or SA)



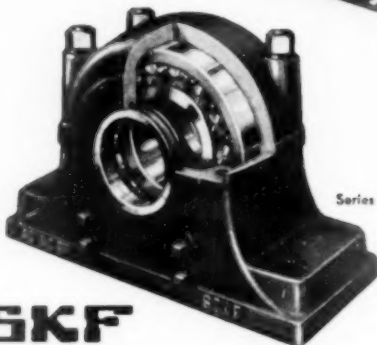
Series SES



Series FUS  
(or FUA and FUAR)



Series SUAR  
(or SUA)



Series SDAF

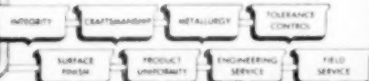
## PILLOW BLOCKS ENGINEERED BY SKF

Specify pillow blocks and flanged mountings by **SKF** and you get bearings and housings engineered as a unit. What does this mean to you? It means you get the full benefit of **SKF**'s skill and precision methods of manufacture. It means you're sure of minimum friction and trouble-free, low-cost operation. It means efficient seals that retain lubricant . . . keep out dust and abrasive elements. It means minimum maintenance . . . maximum efficiency.

**SKF** supplies 5 basic types of pillow blocks for shafts from 1/2-inch to over

9-inches . . . and 2 basic types of flanged mountings for shafts from 1/2-inch to 2 1/8-inches. Whether you need Series SES for lightly loaded applications or Series SDAF to withstand unusual shock and heavy thrust loads . . . or any intermediate type . . . there's an **SKF** pillow block that's exactly right for the job.

Check your **SKF** Distributor, he has a stock of these pillow blocks and flanged mountings to meet all your requirements. **SKF Industries, Inc.**, Philadelphia 32, Pa. 7044



Pioneers of the Deep Groove Ball Bearing—  
Spherical Roller Bearing—Self-Aligning Ball Bearing

ROCK PRODUCTS, May, 1950

Look to **P&H** for Added Values



## NOW, it costs LESS to do your jobs BETTER!

In every one of these operations, materials are being moved and handled for less—thanks to the continuous, cost-cutting performance of the P&H.

Of the many P&H Added Values, these alone will account for important savings for you. Add all the others and you know why so many operators, mindful of today's changing conditions, are putting P&H Excavators in their pits and yards.

**HYDRAULIC CONTROL**—years-ahead engineering makes P&H's faster and simpler to operate with a velvety action that's easier on man and machine.

**TRUE TRACTOR TYPE CRAWLERS**—smoother, more maneuverable and dependable travel; easier steering; ends usual crawler troubles.

**PLANETARY CHAIN CROWD**—P&H pioneered it; made it more accurate, more rapid reversing. Outlasts 25 to 30 crowd cables.

**WELDED CONSTRUCTION THROUGHOUT**—rolled alloy steels make them huskier, shockproof; no needless deadweight.



**P&H DUAL-POWERED TRUCK CRANES.** One engine right for faster travel, another with power right for faster working. Converts for all classes of work. Available with P&H Remote Control.

**P&H CRAWLER EXCAVATORS.** Built in all sizes up to 6 cu. yds.; gasoline, Diesel or electric powered. Write for literature.

Get the full story on P&H Added Values. Mail coupon on your business letterhead now!



**HARNISCHFEGER**  
CORPORATION

EXCAVATORS - ELECTRIC CRANES - AND WELDING

**EXCAVATORS**

4465 W. National Ave.  
Milwaukee 14, Wis.

HARNISCHFEGER CORPORATION, Excavator Division  
4465 W. National Ave., Milwaukee 14, Wisconsin

Gentlemen:

Send complete information covering P&H models from \_\_\_\_\_ to \_\_\_\_\_ cubic yards.  
I also P&H Truck Cranes. I am attaching coupon to my business letterhead.

Name \_\_\_\_\_

Company \_\_\_\_\_ Position \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ Zone \_\_\_\_\_ State \_\_\_\_\_

# Overcome Problem of High Starting Torque

**ALLIS-CHALMERS**  
**Grinding Mills**

## Check These Features!

- ▶ Trunnions built with maximum metal thickness at point of greatest stress.
- ▶ A gradual curvature from trunnion to head eliminates any localization of stress.
- ▶ Trunnion cast integral with heads for added strength.
- ▶ "One company" responsibility—buy your mill complete with motor, control and drive... proper feeder and liners... flexible coupling or magnetic clutch—all from Allis-Chalmers!

**T**RUNNION BEARINGS on all the larger sizes of Allis-Chalmers grinding mills are supplied with an individual high pressure lubricating pump to provide lubricant between mill trunnion and bearing during initial starting, insuring minimum starting torque and bearing wear.



Hand operated bearing lubricating pump.

Floating the mill in this way results in much less punishment to vital parts. Reduced starting torque gives you less strain on gear teeth and less torsional strain on the pinionshaft.

### REDUCES DOWNTIME

Protection from excessive wear and strain in starting your mill will prove to be immensely important in terms of less costly maintenance and

less idle mill time. Another reason it pays to specify A-C mills!

Allis-Chalmers builds a complete line of grinding mills: ball and rod mills; pebble mills, Compeb and Ballpeb mills. The A-C representative in your area can be a big help in working out grinding problems. Call him today, or write:

ALLIS-CHALMERS, 975A SO. 70 ST.  
MILWAUKEE, WIS.

*Compeb, Ballpeb and Texrope are Allis-Chalmers trademarks.*

## ALLIS-CHALMERS

Sales Offices in  
Principal Cities in  
the U. S. A. Distributors  
Throughout the World.



Motors



Controls



Texrope Drives



Vibrating Screens



Crushers



Kilns, Coolers, Dryers



# Compare THESE GRAPHS !

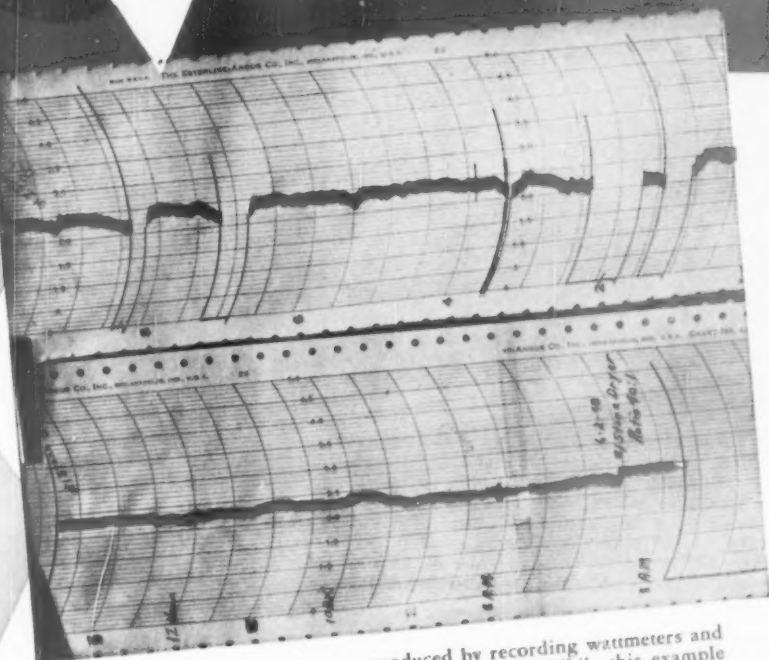
... 100 H.P.  
GEARS ENGINEERED  
BY

## Stroh

PERFECT CONTINUOUS, ECONOMICAL  
SMOOTH FLOW OF POWER

This graph shows the costly, intermittent operation of the #2 Stone Dryer in a modern cement plant, resulting from the unsatisfactory performance of Standard 14½" Involute Cast Tooth Gearing. Are you getting this type of service from your gears?

The gears on the #1 Stone Dryer in the same plant are of Stroh Steel 20° Involute Long and Short Addendum Cast Tooth. Note the continuity of operation and smooth flow of power these gears make possible.



The above graphs were produced by recording wattmeters and show the power input on the two dryers. While this example illustrates the superior performance of Stroh gears on Stone Dryers, they are equally as efficient on kilns—coolers—tube, rod, ball mills and all similar applications.

The smoother flow of power on the #1 Dryer resulted from the use of Stroh Steel 20° Involute Long and Short Addendum Cast Tooth Gearing.

Wear-resistant Stroh Alloy on the active contour of the gear teeth maintains their original contour and insures continuity of a smooth flow of power.

On receipt of your inquiry, we will gladly supply further data on your specific problem without obligation. Write today.

# Stroh

## PROCESS STEEL CO.

PITTSBURGH 12, PENNA., U.S.A.

ROCKING TOMBS, South American Representative

Representative of STROH ALLOY CAST TOOTH GEARS



# Automatic Dust-Free System for **HYDRATED LIME** Production

UNIFORMITY

PURITY

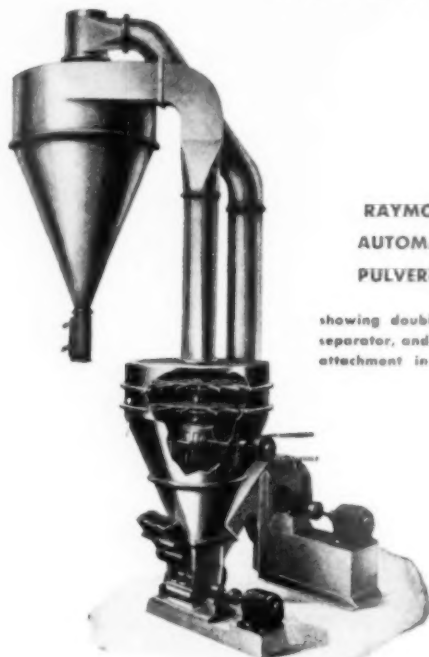
ECONOMY

THE Raymond Automatic Pulverizer is the universally recognized machine throughout the United States and many parts of the world for disintegrating, classifying and rejecting impurities from hydrated lime. These operations are performed simultaneously on this one unit.

The Whizzer-equipped Pulverizer provides many definite operating advantages. Capacities have been increased in some cases with the whizzer to twice the output available with the Double Cone Separator on the finer grades.

All grades of hydrated lime from mason's hydrate with finenesses of about 95% passing 100-mesh to chemical and spray limes at 99.9% or better passing 325-mesh can be produced on this unit. Production of a uniformly high quality hydrate is assured, and changing the grade consists merely of one simple adjustment, made externally while the unit is running.

Raymond Automatic Pulverizers are manufactured in several sizes for almost any capacity requirement. One of these up-to-date pulverizing units will be a money-saving addition to your plant.



RAYMOND  
AUTOMATIC  
PULVERIZER

showing double whizzer  
separator, and throw-out  
attachment in door.

Write for Catalog No. 60 and  
tell us the requirements of your  
problem

**COMBUSTION ENGINEERING—SUPERHEATER, INC.**



RAYMOND PULVERIZER DIVISION

1307 North Branch St., Chicago 22, Illinois



Quarry and mine owners all over the world know from experience that a Bucyrus-Erie excavator is their best assurance of dependable high output combined with on-the-job reliability through years of service. The 5 cu. yd. 120-B is a typical example of Bucyrus-Erie years ahead design, from its hard-digging dipper with tough manganese steel lip to its ground-gripping treads, heat-treated to withstand wear. Its

smooth Ward Leonard control and careful balance of speeds and power give the operator complete mastery of every function for a speedy, output-boosting cycle.

With capacities from  $\frac{3}{4}$  to 36 cu. yds., there is a Bucyrus-Erie to fit any quarry or mine requirement, and to meet production demands with fast, smooth, economical operation.

109L50



SOUTH MILWAUKEE, WISCONSIN

# FIRST CHOICE FOR POWER\*



**Ford**  
INDUSTRIAL ENGINES



**Ford "254" Power Unit**  
6 cylinder, 254 cu. in. displacement  
(also available in open type power unit  
or engine assembly only)

More and more leading equipment builders are making Ford Industrial Engines and Power Units their "first choice" power sources. Makers of agricultural machinery... air compressors... derricks and hoists... lumber and sawmill equipment... pumps... road and construction machinery and the like have made Ford Power standard equipment on their products because it's the power that's right 3 important ways.

**1. RIGHT POWER**—five power sizes from which to choose... each one complete, ready to run.

**2. RIGHT FEATURES**—every model has all the benefits of Ford's famed progressive engineering.

**3. RIGHT SERVICE**—as near as the nearest Ford Dealer, clear around the world.

Bring your power problem to your Ford Dealer, to the Ford District Sales Office nearest you or the Ford Industrial Engine Department. There's a Ford Industrial Engine that's right for your job.

## FORD INDUSTRIAL ENGINES

are offered as complete power units or as individual units, either open or closed, both with a wide variety of special attachments. They are made in the following types and sizes:

120 CU. IN. 4 CYLINDER

225 CU. IN. 6 CYLINDER

254 CU. IN. 6 CYLINDER

229 CU. IN. V-TYPE 8 CYLINDER

337 CU. IN. V-TYPE 8 CYLINDER

**Your Job is Well-Powered  
when It's Ford-Powered**

INDUSTRIAL ENGINE DEPT., FORD MOTOR COMPANY, DEARBORN, MICHIGAN

Send me complete details on your Industrial Engines and Power Units.

Name \_\_\_\_\_

Street \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_

CLIP AND MAIL THIS COUPON NOW!

Industrial Engine Department  
**FORD MOTOR COMPANY**  
Dearborn, Michigan



**COSTS COMING DOWN...**

**CAPACITY GOING UP...**

## WITH REX ELEVATOR CHAINS and BUCKETS!

With Rex Elevator Chains, Sprockets and Buckets, you can increase elevator capacity . . . reduce operating and maintenance costs. Because there is a Rex Chain, Sprocket or Bucket that exactly fits every type of elevator service, you can select the equipment that will best stand up under the service requirements . . . add capacity through the elimination of premature failures that hold up production.

Each Rex Elevator Chain, Sprocket and Bucket is designed specifically for the conditions under which it must operate. Chain attachments are designed for the chain with which they are to run—for equal load distribution and long life. Speeds, capacities, type of material handled, daily number of operating hours are basic considerations that determine the type of chain to be used.

For help in selecting the right chain, sprocket or bucket for your elevators, consult your local Rex District Office or write direct to Chain Belt Company, 1649 West Bruce Street, Milwaukee 4, Wis.



**DRIVE AND CONVEYOR CHAINS**

**FIRST FOR LASTING SERVICE**

*now available from stock*



### REX LEY BUSHED CHAINS

For moderate loads and speeds, exceptionally severe abrasive service



### REX DUROBAR COMBINATION CHAINS

For general, moderate load, slow speed service



### REX CHABELCO CONVEYOR CHAINS

For heavy loads, high speeds, severe abrasive conditions



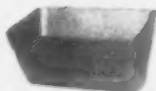
### REX CHABELCO DRIVE CHAINS

For efficient, low-cost power transmission



### REX STYLE "A" BUCKET

For General Service



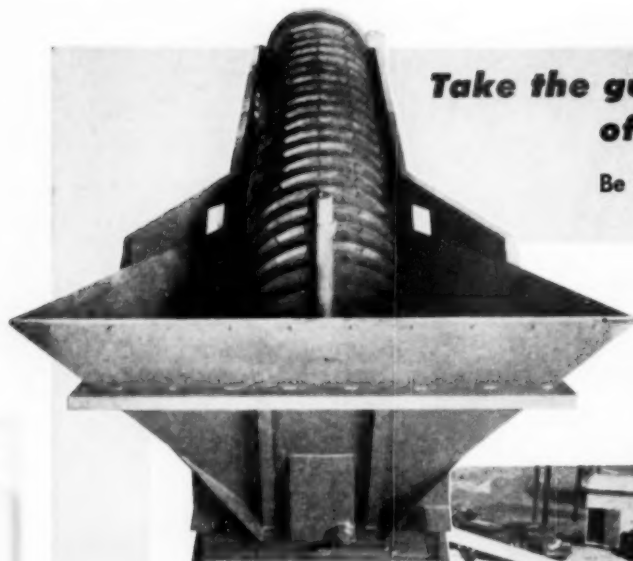
### REX STYLE "AA" BUCKET

For heavier, more abrasive materials

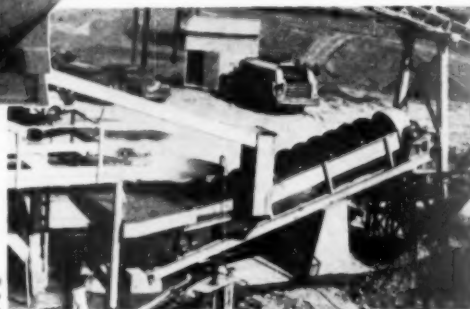


### REX TEMPERIM SPROCKETS

With hardened teeth and rims for long service under abrasive operating conditions.



No. 48 WEMCO  
Sand Preparation Machine



No. 48 WEMCO  
Sand Preparation  
Machine in action

**Take the guesswork out  
of production!**

Be sure of your product  
with

## **WEMCO SAND PREPARATION MACHINES**

**SPECIFICATION SANDS—CLEAN AND DRY**—are assured by the exclusive WEMCO spiral design which provides positive control and proper balance between sand raking and waste overflow.

Today's market demands sands that meet exacting specifications. You can be sure of meeting these specifications with WEMCO machines.

**WEMCO SAND PREPARATION MACHINES** have proved their value in automatic, low cost operation for:

- Dewatering and desliming
- Control of fine fractions
- Control of medium fractions
- Sand manufacture
- Preparation of special sands

Write today for full information and prices.

# **WEMCO**

**WESTERN MACHINERY COMPANY**

780-786 FOLSOM STREET · SAN FRANCISCO 7, CALIFORNIA

WRE (HMS) Mobil-Mill • Coal Spiral • Standard Thickeners (HMS) Thickeners • (HMS) Media Pumps • Hydroseparators (HMS) Densifiers • (HMS) Separatory Cones • "SH" Classifiers Sand Pumps • Conditioners and Agitators • Fagergren Flotation Machines • Dewatering Spirals • (HMS) Laboratory Units

#### **PRINCIPAL OFFICES**

San Francisco • Sacramento • Salt Lake City • Spokane  
Pocatello, Idaho • Denver • Phoenix • Tucson • Chicago  
Hibbing, Minnesota • Bartow, Florida • New York

#### **EXPORT DISTRIBUTORS**

The Ore and Chemical Co.  
80 Broad Street • New York 6, N.Y.  
Continental Europe and North Africa  
Dr. Ing. Herbert Löffler, A.B. Stockholm 3, Sweden  
S.B.M.U. Paris, France  
Ferdinand Egeberg & Company, Oslo, Norway  
Rider, Milan, Italy  
A. Schubert & Company, Basle, Switzerland  
G. Malinowski & Co., Athens, Greece  
Agence Miniere & Maritime, S.A., Antwerp, Belgium  
Adi Gabay & Albert Koenka, Istanbul, Turkey  
Philippine Industrial Equipment Co., Manila, Philippines  
Fraser & Chalmers (S.A.) Ltd., Johannesburg, South Africa



# TOUGH MOUNTAIN HAULS

## ... a daily dish

**H**AULING 10½ bank yard loads of granite over mountain trails at altitudes up to 8300 feet is a real test of a Diesel engine's brute strength and stamina.

To see how General Motors Diesels take such work in stride, look at the record three LeTourneau Tournarockers, powered with GM Diesels, made for contractors Horner and Switzer on relocation of United States Highway 280 at Granby Dam, Colorado.

Checked on a haul of 1240 feet each way, including a 170-foot stretch of 13% adverse grade, each Tournarocker took only 4¼ minutes to travel, dump and return to shovel. Haul road conditions were poor due to heavy rainfall. Yet haul cycles were so fast that on most distances only two of the Tournarockers were needed to keep the 2½-yard rock shovel busy. Together, these three 16-ton units moved 220,000 yards of granite.

Here is self-evident recommendation of GM Diesel's powerful 2-cycle operation — power at every piston downstroke. It makes them compact, easy to start, quick on the pickup, clean burning and efficient at any altitude.

If you're interested in dependable power with rugged performance and low fuel costs, you'll want all the details about GM Diesels. See your distributor or drop us a line.



### DETROIT DIESEL ENGINE DIVISION

SINGLE ENGINES... Up to 275 H.P.

DETROIT 28, MICHIGAN

MULTIPLE UNITS... Up to 800 H.P.

GENERAL MOTORS

**DIESEL BRAVN WITHOUT THE BULK**



# HUNGRY HORSE DAM FED BY "U.S." BELTING

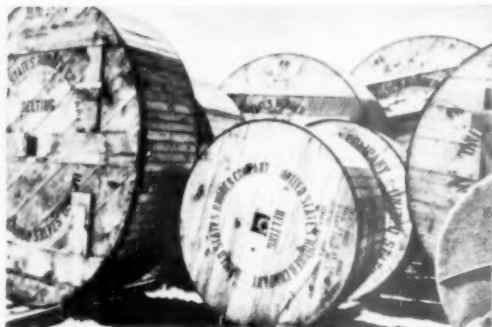
Nearly 6 million tons of sand and gravel will be carried to site of mammoth job in Northwestern Montana—on U. S. Rubber Belting



NEARLY THREE MILES of U. S. Rubber Conveyor Belting, varying in width from 24" to 42", is used in all the phases of aggregate processing at the Hungry Horse Dam. Above is shown a series of the belts carrying sized materials to the storage piles.



UNITED STATES RUBBER ENGINEERS worked with the constructors of the dam and the designers of conveyor equipment to produce this highly efficient conveyor system. ALL the belting used to "feed" Hungry Horse was furnished by U. S. Rubber.



A FEW OF GIANT crates in which belts were shipped give an idea of the tremendous footage of belting—over 15,000 feet—used at Hungry Horse, country's third largest concrete dam when completed. It is being built for the U. S. Bureau of Reclamation.

Whenever you have a problem involving materials handling, no matter how big or small, get in touch with our engineers. They will gladly cooperate with your own men in working out a solution. Write to:

A DEVELOPMENT OF



**UNITED STATES RUBBER COMPANY**

MECHANICAL GOODS DIVISION • ROCKEFELLER CENTER, NEW YORK 20, N. Y.



# Rolling Again in 36 Hours

## THANKS TO ALLIS-CHALMERS CERTIFIED SERVICE!

A vital press of the Detroit News went out of commission when a 5 hp inching motor, overspeeded at 20,000 rpm, flew apart. Stecker Electric, an A-C Certified Service Shop, was called. Broken end bells had to be welded and machined to fit. The stator was rewound. Rotor windings were replaced. After completely testing the motor, it was back in service in just 36 hours!

IN DETROIT, and over 75 other cities covering all major industrial areas, you will find Allis-Chalmers Certified Service Shops. Make them your source for fast, reliable electrical repair service! Independently owned and operated,

these shops have been selected for their experience, highly skilled workmen, complete servicing facilities, and sound business reputation.

To save time, trouble and money on emergency or routine maintenance service call on your nearest Allis-Chalmers Certified Service Shop.

**GOOD SOURCE FOR NEW MOTORS, TOO** Remember — your local Allis-Chalmers Certified Service Shop or Authorized Dealer offers the same fast, dependable delivery on new motors—plus matching control from one to 200 hp. For service or new equipment, count on Allis-Chalmers.

ALLIS-CHALMERS, 975A SO. 70 ST. A-301  
MILWAUKEE, WIS.

*Texrope and Vari-Pitch are Allis-Chalmers trademarks.*

# ALLIS-CHALMERS

ROCK PRODUCTS, May, 1950

Sold . . .  
Applied . . .  
Serviced . . .

by Allis-Chalmers Authorized Dealers,  
Certified Service Shops and Sales Offices  
throughout the country.



**CONTROL** — Manual, magnetic and combination starters; push button stations and components for complete control systems.

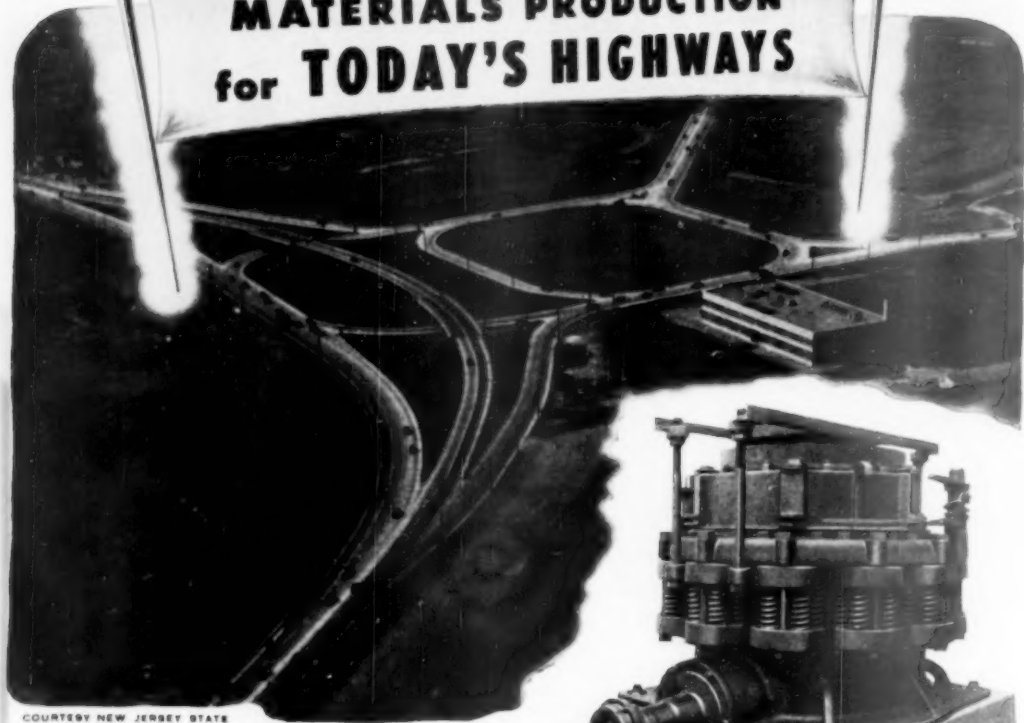
**TEXROPE** — Belts in all sizes and sections, standard and Vari-Pitch sheaves, speed changers.



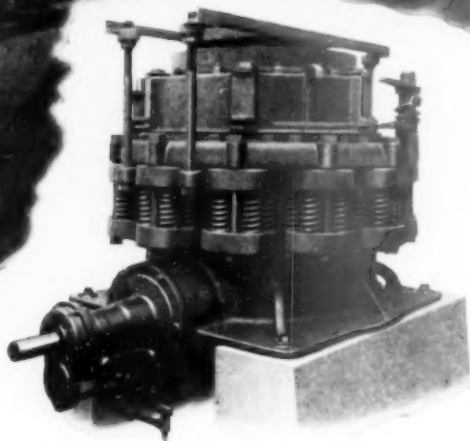
**PUMPS** — Integral motor and coupled types from  $\frac{1}{2}$  in. to 72 in. discharge and up.



# QUANTITY and QUALITY MATERIALS PRODUCTION for TODAY'S HIGHWAYS



COURTESY NEW JERSEY STATE  
HIGHWAY DEPARTMENT



If you have a newly built plant equipped with Symons Cone Crushers or one modernized by the installation of Cones, then your plant is prepared to meet the demand for materials arising from the construction of modern highways. For quantity production of finely crushed materials, no crusher has ever approached the performance of the Cone. This crusher is equally outstanding for making quality materials in the finer sizes for

aggregate and as required for bituminous type roads. If your plant is not equipped for producing in capacity these sizes for which there is an ever growing demand, follow the example of leading producers everywhere who do their reduction crushing with Symons Cones.

Whether your fine crushing demands are but a few tons an hour or a major operation of hundreds of tons, there is a Symons Cone that will exactly meet your needs for tonnage and product. In addition to reduction crushers, Nordberg also builds primary crushers of the heavy duty jaw and gyratory types. If you have a crushing problem, submit it to Nordberg for solution.

**NORDBERG MFG. CO.** MILWAUKEE WISCONSIN

NEW YORK • SAN FRANCISCO • WASHINGTON • LONDON • TORONTO • JOHANNESBURG

## SYMONS CONE CRUSHERS



145-h.p. Series F-8 Big Job, with special tandem rear axle, one of over 175 Ford Economy Truck models, has an allowable G.V.W. rating as a six-wheeler of 35,000 lbs.

## "We doubled tonnage...cut rock delivery costs about 33%" — SAYS H. B. GRAHAM, PUEBLO, COLORADO

"WHAT A TERRIFIC JOB our nine Ford F-8 Big Jobs are doing on the Pueblo to Canon City highway," reports H. B. Graham.

"We have doubled tonnage per day over our previous trucks. And you should see our drivers scramble for a Ford when a new one is delivered. They think the new Fords are the greatest things that ever happened in trucking. I share that opinion because we've cut rock delivery costs about 33%."

*Ford trucks do more work!* They're Bonus Built with big reserves of strength and power to handle big loads. *Ford trucking costs less!* Volume production know-how results in low original price. Truck engineering know-how keeps operating costs low.

See your Ford Dealer today! Choose from over 175 models ranging from 95-h.p. Pickups to 145-h.p. Big Jobs. G.V.W. ratings from 4,700 lbs. to 22,000 lbs. There's a Ford Truck to fit your job and your budget. And, remember, Ford Trucks "do more per dollar!"

## Ford Trucking Costs Less Because— FORD TRUCKS LAST LONGER

Using latest registration data on 6,392,000 trucks,  
life insurance experts prove Ford Trucks last longer!

### SAVE WITH FORD!

### AMERICA'S NO.1 TRUCK VALUE!

- ★ **SAVE GAS** with Ford Loadomatic Ignition and High Turbulence combustion chambers.
- ★ **SAVE OIL** with Ford Flightlight aluminum alloy pistons. Cam ground for oil-saving fit at operating temperatures.
- ★ **SAVE WEAR** with pressure lubricated main and crankpin bearings, Double Channel frame, extra heavy duty axles, big brakes (up to 16-in. by 5-in.)
- ★ **SAVE ON REPAIRS** with demountable brake drums, brake inspection hole, engine-top setting of accessories, plus nationwide service from over 6,400 Ford Dealers.
- ★ **SAVE TIME** with Ford reliability and performance. The only eight-cylinder engines in trucking. Only Ford gives you a choice of V-8 or Six!

#### MAIL THIS COUPON TODAY!

FORD Division of FORD MOTOR COMPANY  
3234 Schoeffer Rd., Dearborn, Mich.

Send me without charge or obligation, detail specifications on Ford Trucks for 1950.

FULL LINE ☐ HEAVY DUTY MODELS ☐  
LIGHT MODELS ☐ EXTRA HEAVY DUTY MODELS ☐

Name \_\_\_\_\_  
(Please print plainly)

Address \_\_\_\_\_

City \_\_\_\_\_ Zone \_\_\_\_\_ State \_\_\_\_\_



# UNAX ROTARY KILNS CUT FUEL COSTS

More than 600  
Unax Rotary Kilns  
have been supplied

The saving in fuel se-  
cured from this Unax Kiln

justified the installation of  
this additional Unax Kiln



**F. L. SMIDTH & CO.**

11 WEST 42nd STREET, NEW YORK 18, N.Y.

Engineers and Machinery Manufacturers

# "WE HEAR..."

May, 1950

With a record year behind it, the construction industry has the possibility in 1950 of performing the greatest one-year volume of construction in history, both dollarwise and physical, ranging from \$29 billion to \$30 billion, according to the Associated General Contractors of America. This includes \$20 billion of new construction, and the balance in maintenance and repairs. The entire volume for 1949 was \$28.5 billion.

\*\*\*\*\*

Steel capacity in the United States now closely approaches 100,000,000 tons a year. That record high level was attained by an increase of 3,271,870 tons last year.

\*\*\*\*\*

Cost of building two-lane concrete pavements on the Illinois State highway system during 1949 was almost \$32,000 per mile less than in 1948, according to a comparison of contract awards. In 1948, the division of highways awarded contracts for construction of 17.71 miles of two-lane pavement at a total contract price of \$2,338,223, or an average of \$132,028.04 per mile. During 1949, contracts awarded for 54.11 miles of similar work total \$5,423,902.45, or an average of \$100,238.45 per mile.

\*\*\*\*\*

Volume of freight carried by large inter-city motor lines in 1949 was 4.4 percent greater than in the preceding year. Volume increases were up in seven of the nine regions by amounts ranging from 0.8 percent in the Northwest to 14.2 percent in the South, American Trucking Association reports.

\*\*\*\*\*

The Federal Housing Administration, during the year 1949, issued commitments to insure mortgages on approximately 18,000 units of prefabricated housing. These commitments represent approximately 50 percent of all housing units produced and sold by the home prefabrication industry last year and totaled approximately \$118,000,000. These figures, which represent a substantial increase over previous years' operations, are considered an indication of a "growing acceptance" of the prefabricated-type home.

\*\*\*\*\*

Sand molds and cores are being used in Germany to make precision castings in many metals. A plastic compound binds the sand and forms a mold of unusual smoothness, dimensional stability and high gas permeability. The process is said to be exceptionally good for casting very thin sections.

\*\*\*\*\*

The New Jersey State Highway Department, after a careful inspection of the pavements, bridges and structures on the state highway system, has concluded that vehicle weights should be limited to 20,000 lb. on single axles and 28,000 lb. on tandem axles as a safe limit for state pavements. The 20,000-lb. single axle limit is 2,000 lb. higher than the maximum in 32 other states. An 18,000-lb. limit is recommended by the American Association of State Highway Officials.

\*\*\*\*\*

The Government, despite all its fuss over basing points and freight absorption, is in effect doing the same thing in its "uniform freight rate" system of selling synthetic rubber. Buyers pay a uniform base pound price f.o.b. the plant or warehouse, plus a fixed per pound freight charge regardless of destination. The Government either absorbs freight or collects phantom freight.

## WE HEAR

The Brazos River Conservation and Reclamation District, a Texas state agency, has told the Federal Power Commission it wants to build and operate three small hydroelectric stations on the Brazos in Palo Pinto and Hood counties, west of Ft. Worth. The three plants would add up to 90,000 kv.a. total capacity.

The fast pace of construction kept up in March, according to Departments of Commerce and Labor, and helped make the 1950 first quarter total the highest on record. Expenditures for new construction put in place during March were \$1.5 billion, an increase of 8 percent over the "unusually high" February figures, and 18 percent better than the like month of 1949. This put the total for the quarter at \$4.4 billion, also 18 percent above the like period last year. Private construction in the period was up 17 percent and public construction, 21 percent. Homebuilding, not including farm construction, accounted for 44 percent of the first quarter total this year, against about 35 percent in 1949.

Employment rose in March. The Census Bureau reports that the number of persons at work climbed to 57,551,000, up 589,000 from February. At the same time, unemployment declined to 4,123,000. This was a decrease of 561,000 from February when unemployment reached an 8-year high.

The House of Representatives has approved without opposition an expansion of almost \$4 billion in the federal housing program.

According to the Veterans Administration, 12 percent of all G.I. job trainees have asked for training in construction in the past two years. Construction students more than tripled from 1947 to 1949, going from 10,130 to 31,300.

Massachusetts has joined the group of states experimenting with rubber highways. Two 1000-ft. stretches of road have been treated with rubber in a test to determine their ability to stand up under constant freezing and thawing throughout the winter. The cost of laying the strips, with 5 to 10 percent rubber added to bituminous concrete, was about \$9000. As a further test, one section was laid with a powdered type of rubber and the other with an emulsified mix.

All concrete has been poured at Ft. Gibson Dam on the Grand River near Muskogee, Okla., but the project is two years away from final completion, the Tulsa district U.S. Engineers' office has announced. Work yet to be done includes completion of a two-lane highway across the structure.

An employer probably can get N.L.R.B. and the courts to stop a union from picketing as part of a secondary boycott, even though the picketing is peaceful. A federal circuit court of appeals upheld an order of N.L.R.B. directing a union to cease and desist from inducing and encouraging a secondary boycott. The union was found to have engaged in an unfair labor practice under the Taft-Hartley Act.

The House Armed Services committee has approved a \$689,000,000 program to strengthen key defense points overseas and at home and to expand military research activity.

Another big piece of government credit is on the way to maintain steam behind the housing boom. According to Engineering News-Record, almost \$3 billion will be made available by May in the Sparkman-Spence bill. Under it, homes selling at prices up to \$7000 will get the most liberal terms, requiring only a 5 percent cash down payment when FHA-insured mortgages are used.

THE EDITORS

now...



## ELECTRIC PRECIPITATOR

This announcement of the availability of a made-in-America "SF" Precipitator is NEWS of broad significance. With a Precipitator, also, Buell is in a position to provide any efficiency desired in the collection and recovery of fine and ultra-fine dusts.

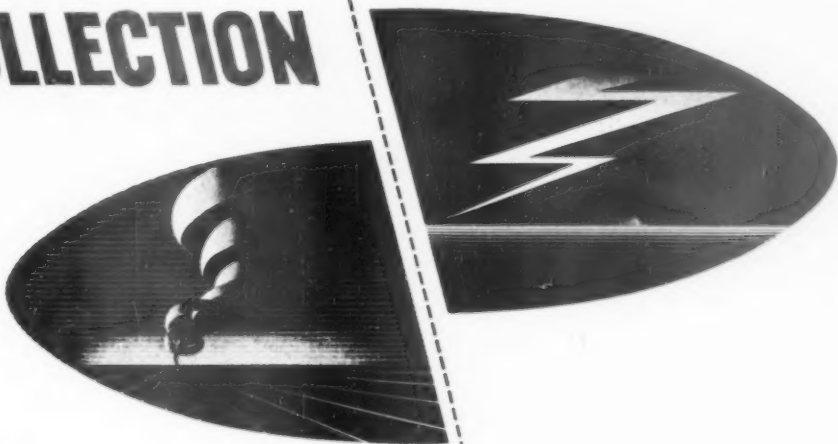
The Buell "SF" Electric Precipitator is made under license from Svenska Flaktfabriken, subsidiary of ASEA (Swedish General Electric Company). Through 18 years of engineering experience and more than 150 installations in 11 countries, the broadest range of operating conditions have been met. The "SF" Precipitator now takes up equivalent first line service in the Americas.

- in separating and collecting dusts of value suspended in process air or gases.
  - in fly ash and nuisance dusts collection for general air pollution abatement.
- Sizes and types of equipment are standardized to meet all needs.

The Buell Sales Engineering Staff invites opportunity to discuss specific problems. Write, wire or telephone.

World experience  
in both techniques of

## DUST COLLECTION



van Tongeren

## CYCLONE

Scientific dust collection and the doing away with air pollution was just coming into its own in 1935, when Buell introduced to America the high efficiency van Tongeren designs of AERODYNE.

The Buell van Tongeren Cyclone pioneered in lifting centrifugal dust separation onto a new high plane. How solidly its patented van Tongeren Shave-off contributed to reaching otherwise unobtainable efficiencies is evidenced in the multi-industry use of this Buell System—and 15 year records of multiple re-orders. For many, many conditions the Buell van Tongeren Cyclone is bound to be first preference, with fractional efficiencies, costs, operating simplicity and long term reliability all taken into account. Catalog on request.



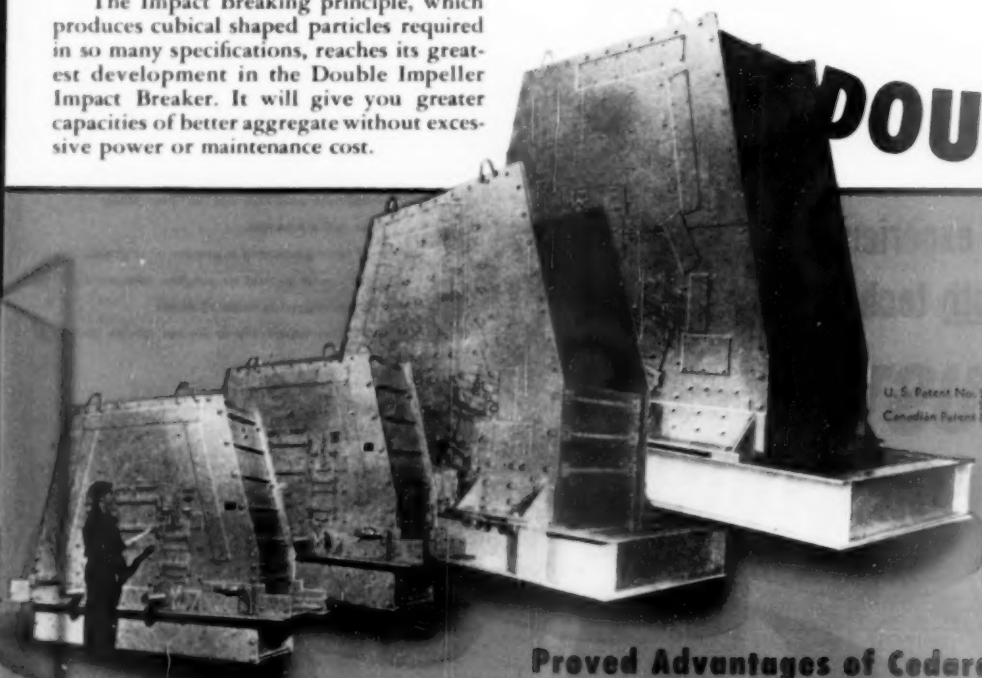
ENGINEERING COMPANY

78 Pine Street, Suite 5005, New York 5, N. Y.

HERE'S the latest addition to the already broad line of Cedarapids crushers! The Double Impeller Impact Breaker, formerly made by New Holland, makes it possible to handle almost *any* primary or secondary crushing job with Cedarapids equipment.

The Impact Breaking principle, which produces cubical shaped particles required in so many specifications, reaches its greatest development in the Double Impeller Impact Breaker. It will give you greater capacities of better aggregate without excessive power or maintenance cost.

# NOW A DOUBLE



U. S. Patent No. 2,173,601  
2,485,425  
Canadian Patent No. 479,371

## Proved Advantages of Cedarapids Double Impeller Impact Breaker

- ★ **EXTREMELY** high ratio of reduction means less accessory equipment such as conveyors, hoppers, screens, elevators and secondary crushers.
- ★ **PRODUCES** ideal cubical product even in slabby material. In eastern quarries where conventional types of crushers broke the stone up into high percentages of flats and elongated particles the Impact Breaker reduced the percentage from 34% to 6%.
- ★ **ELIMINATES** most soft stone from the finished product.
- ★ Can be operated in contaminated material where most other types of equipment would clog, because a greater number of large pieces of stone or gravel bombarding the cage bars help to keep the breaker clean.
- ★ **LESS** horsepower required per ton of material

- ★ is most all cases because the massive impellers statically balanced, have a flywheel effect and a great percentage of stone is broken in mid-air by stone hitting stone resulting in a greater reduction in milling and crushing action.
- ★ **BIG** volume production. In a dolomite installation in Ohio the operator claimed 720 tons per hour using two 150 h. p. motors.
- ★ **APPROXIMATELY** 50% less contact of stone on metal because a high percentage of the material is broken by impact against other material rather than against the breaker bars. Also attrition minimized as entire discharge opening is free of gravel, etc.
- ★ **BIG** production and high reduction ratio mean lower plant investment.
- ★ **CHOICE** of four sizes from Model 5050, which will take 50" rock up to 400 tons per hour and reduce it to 4" minus in one operation, down to the Model 2020 with its 20" square feed opening.

**Cedarapids**

Built by  
IOWA

### THE IOWA LINE of Material Handling Equipment includes:

ROCK AND GRAVEL CRUSHERS • BELT CONVEYORS • STEEL BINS • BUCKET ELEVATORS  
VIBRATOR AND REVOLVING SCREENS • UNITIZED ROCK AND GRAVEL PLANTS • FEEDERS  
TRIPS • PORTABLE POWER CONVEYORS • PORTABLE STONE AND GRAVEL PLANTS  
REDUCTION CRUSHERS • BATCH TYPE AND VOLUMETRIC TYPE ASPHALT PLANTS  
HAMMERMILLS • DRAG SCRAPER TANKS • WASHING PLANTS • SOIL COMPACTION UNITS  
STEEL TRUCKS AND TRAILERS • CUBIT IMPACT BREAKERS



# Cedarapids

Built by  
IOWA

# PRODUCT!

## IMPELLER IMPACT BREAKER (formerly New Holland)

### DOUBLE IMPACT ACTION GIVES YOU ALL THESE ADVANTAGES

★ MATERIAL entering the breaking chamber falls directly onto the rotating impellers. Rotating upward and outward at speeds up to 1000 rpm., these Double Impellers smash the material in mid-air. Up to 6000 smashing blows a minute crash against the material in the breaking chamber.

★ High percentage of fines can be obtained by operating the impellers up to 1000 rpm. with close bar settings, thereby eliminating need for secondary reduction equipment in many instances.

★ These breakers can be used for primary and secondary reduction depending upon the application and the model used.

★ Only two moving parts—the impellers—both easily accessible. Minimum down time for repairs or replacements because of simplicity of design.



Sectional view of Cedarapids Double Impeller Impact Breaker showing simplicity of construction and operation. Material falls directly onto impellers and is hurled against the breaker bars and other material in the breaking chamber.

★ The product size is controlled by the speed of the impellers and the adjustment of the breaker bars. No mechanical change is necessary to change the size of product but simply increase or decrease the rpm.

★ Only Cedarapids Double Impeller Impact Breakers give you all these features. No imitation can equal their performance. Protected fully by patents. Beware of imitations.

### To Present Owners of New Holland Double Impeller Impact Breakers

When you need new equipment or replacement parts on your present machine address your inquiries to Cedar Rapids or call your nearest Cedarapids distributor.

### OTHER CEDARAPIDS CRUSHERS



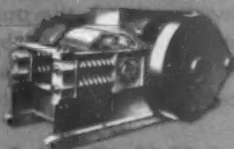
**JAW CRUSHERS**  
in sizes from  
20" x 40" to 6' x 12"



**TWIN JAW CRUSHERS**  
in four sizes from  
1836 to 1216



**HAMMER MILLS**  
in three sizes from  
4033 to 2933



**ROLL CRUSHERS**  
in six sizes from  
4024 to 1616

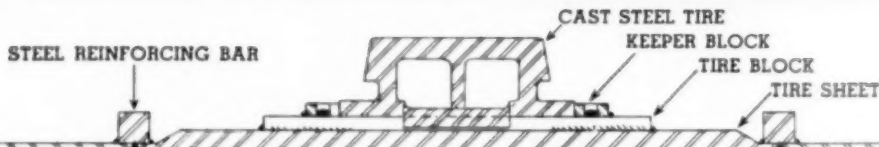
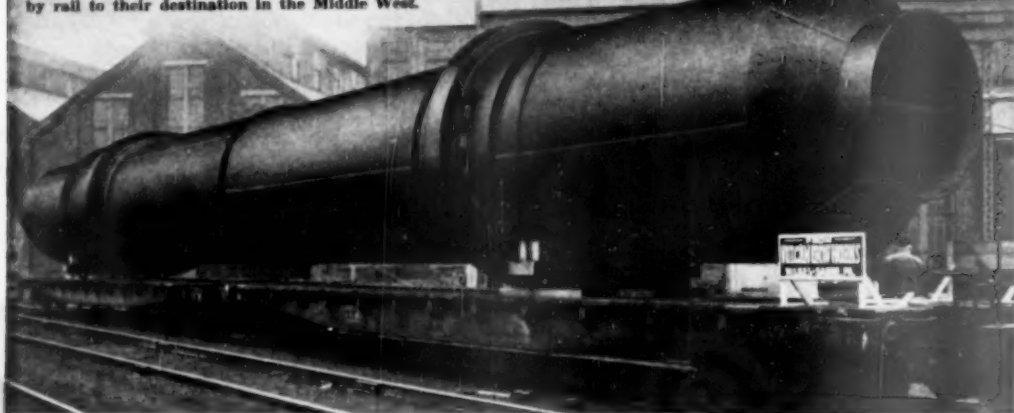


**KUBIT IMPACT BREAKERS**  
in four sizes  
Nos. 0, 1, 2, 3, 4

# IOWA MANUFACTURING COMPANY

Cedar Rapids, Iowa, U. S. A.

Half of shell for Vulcan Rotary Kiln recently delivered to large lime plant. Weighing approximately 135 tons each, this shell section and its other half were the heaviest units ever shipped in one piece by the Vulcan Iron Works and the largest in combined length and diameter that could be shipped by rail to their destination in the Middle West.



## THIS PATENTED RIVETLESS TIRE MOUNTING Cuts Maintenance Costs on Vulcan Rotary Kilns

The longer a Vulcan Rotary Kiln is operated the greater the savings secured—because of its very low costs for maintenance and repairs. Fifty years of continuous experience in the design, manufacture and servicing of this type of equipment has taught our engineers where operating troubles are most apt to occur and how to prevent them.

A typical example of Vulcan Trouble-Preventing Kiln Construction is the patented rivetless tire mounting shown above. Not only does it completely eliminate the rivet-popping once considered inevitable

but its distinctive combination of interlocking lugs and blocks absolutely prevents creeping of the tire in any direction.

Another important advantage is the use of ONE THICK PLATE beneath the tire, instead of several relatively thin plates, thereby improving heat-conductivity and overcoming the former tendency toward burning or bulging of the shell and reinforcing bands at these particular points.

Write us regarding any manufacturing or processing problems within the scope of the equipment listed below. No charge or obligation for estimates, constructive suggestions and preliminary designs.

## VULCAN IRON WORKS

Established 1849

Main Office and Works **WILKES-BARRE, PA.**, New York Office 50 Church

Rotary Kilns, Coolers and Dryers  
Rotary Retorts, Calciners, Etc.  
Improved Vertical Lime Kilns  
Automatic Quick-Lime Hydrators

Toothed, Double-Roll Crushers  
High-Speed Hammer-Type Pulverizers  
Ball, Rod and Tube Mills  
Shaking-Chute and Chain Conveyors

Heavy-Duty Electric Hoists  
Self-Contained Electric Hoists  
Scraper-Loading Hoists  
Cast-Steel Sheaves and Gears

Steam Locomotives  
Diesel and Gasoline Locomotives  
Diesel-Electric Locomotives  
Electric Locomotives and Locomotives

# Plain Facts About MANGANESE ELECTRODES

---

***Here's another instance  
where you can't eat your cake  
and have it too!***

If you demand the ultimate in sound, high-strength manganese weld deposits with no cracking or checking... you can get it with BARE STOODY MANGANESE electrodes. If you are willing to sacrifice high "physicals" produced by these bare rods for the sake of somewhat easier application... coated rods may do the job.

After a little experience, welders will find the NEW STOODY MANGANESE bare electrodes almost as easy to handle as many of the current coated rods. They will notice immediately how smoothly it lays down and its freedom from any tendency to crack. *Here is a manganese that is REALLY DIFFERENT—and better!*

In as-welded deposits, Bare Stoodly Manganese produces these

unusually high physical properties. We believe there are none better:

***Ultimate Tensile Strength—85,000 psi; Yield Point—61,000 psi; Elongation in 2"—18%; Reduction of Area—18%; Hardness (as deposited)—165-175 Brinell or 85-90 Rockwell B; Hardness (work hardened)—375-425 Brinell or 45-50 Rockwell C.***

While we supply coated manganese, we earnestly suggest a thorough test of Bare Stoodly electrodes... *for greater toughness... higher impact strength... full Hadfield properties... fast burn-off... low penetration... unusually good arc characteristics.*

For your next job order bare manganese from your Stoodly dealer. Compare this rod with anything you've seen before. We're glad to leave the future choice in your hands. Literature is available.

## STOODY COMPANY

11929 East Slauson Avenue • Whittier, California

Developed by three years of research . . . and now refined by  
tens of millions of dollars' worth of new equipment!

# Gulf's *GREAT* *NEW* No-Nox

*DESIGNED FOR TODAY'S POWERFUL NEW ENGINES!*

Today's new cars have the most powerful engines ever made. AND—

*They require a super, anti-knock gasoline*

Such a gasoline is the new No-Nox. It was especially designed by Gulf scientists—working hand-in-hand with leading automotive engineers—to give you maximum performance in your new car.

With a gasoline like this great new No-Nox, you can be sure your new car will perform at its brilliant best.

And the new No-Nox not only gives new cars peak performance. It also gives new life, new pep, and stops knocks in older cars too—even many with heavily carboned engines!

So no matter what model you drive, get a tankful of the new No-Nox today.

See for yourself what a difference it makes!

*Whisper-Quiet, Knock-Free Power!*

*Easy, Fast-Firing Starts!*

*Quick, Safe Passing!*

*Unexcelled Mileage!*

***Terrific Power in Every Drop!***



Good Gulf—our famous "regular" gasoline  
—is now better than ever, too!

Gulf Oil Corporation • Gulf Refining Company

# ★ ★ ★ Editor's Page

## Depreciation and Cost of Plant Replacement

**C**ONCERN FOR THE FUTURE WELFARE of their businesses is reflected in annual financial reports of leading cement manufacturers for the year 1949, which show graphically the status of depreciation in relation to the cost of replacements for machinery and equipment at current price levels.

These analyses, which apply to other rock products industries as well, point out clearly that volume of business must be maintained at very high levels like they are today in order that necessary capital expenditures can continue to be made where needed in order to remain competitive and best serve the ultimate consumers' interests. They also indicate the need for liberalized depreciation allowances on old plants so that new capital expenditures can be made more quickly; also, they show the necessity for lower taxes on business income in order to release more money for plant and equipment.

### Depreciation Allowances Inadequate

One large manufacturer of portland cement reported an expenditure of nineteen million dollars for the rehabilitation and improvement of plants during the past five years. Provision for depreciation of plants had been provided for in its accounting system, on an annual basis, according to the accepted principle of pro-rating a proper annual proportion of the *original cost* of the plant assets based on expected productive life.

Actually, the amounts spent over five years for rehabilitation and improvement of the plants involved exceeded the total depreciation provided by more than ten million dollars because of the higher prices for production machinery under present conditions.

As a result, earnings have had to be retained to finance an increasingly larger share of the plant-improvement program over the accumulated depreciation allowances as calculated. This situation isn't peculiar to the portland cement industry. Surveys have indicated that profits of industry, generally, are being called upon to provide an increasingly larger share of funds for plant investment. But, one thing that is inherent to the cement industry and all the rock products industries is that the wear and tear on equipment is far above the average for all industry and the spread becomes greater at the sustained high volume production which these industries are forced to maintain.

Taxation's role in threatening future investment is expressed in an analysis from a report to stockholders of a cement company which read

"since retained earnings can only arise from profits accumulated after payment of corporate income taxes, it is obvious that with the present rate of federal tax of 38 percent it is necessary to earn a profit of \$1.60 before taxes to provide \$1.00 for plant expenditure. Therefore, it costs us a premium of \$0.60 to provide out of earnings \$1.00 which will purchase at today's prices less machinery and equipment than \$0.50 did prior to 1940."

This statement fairly well sums up the situation of industry generally, at a time when the federal administration is saying that business investment is essential for expansion of the national economy and when it is pointing to immense opportunities for business investment with available funds.

### Investment Funds Available

There are some funds available now for the purpose but the total isn't nearly what it could be under more healthful conditions for private industry. A cement manufacturer, or an aggregates producer, can use depreciation allowances supplemented by profits in order to modernize and expand today but his ability to make profits is determined by conditions that require nearly capacity operations which have been prevailing but which are not guaranteed to continue.

The problem then is one of sustaining a large volume of sales along with the cutting of costs in order to meet price declines which are hitting many industries with the return of competitive business. Without this tightening up of the production plant, fixed charges might well soon constitute an even more dangerous threat than they impose today.

There is no mistaking that competitive pricing is at hand. Building contractors, upon whom the cement, aggregates and concrete industries rely for much of their business, are cutting bid prices by ten to fifteen or more percent under 1949 quotations. These markdowns are bound to reflect in prices to be paid material producers and start to work hardship particularly on those producers and suppliers who have not been permitted, through inadequate depreciation allowances and because of the high tax levels, to replace obsolete or uneconomical plant facilities. To top it off, such companies are being pressured into providing more and more employee benefits and shorter work weeks which raise costs.

*Bror Nordberg*





## Thermoid Research Gives Greater Flexibility and Wear-ability to New-Type Hose!

Thermoid has designed *Thermine* Air Hose especially for more efficient and economical use in drilling operations—from construction jobs to mining.

Increased flexibility allows greater freedom of movement and permits bending the hose easily around tight corners. A heavy synthetic rubber

oil-proof tube is reinforced with heavy braided rayon cord. Smooth, extra-heavy rubber cover offers maximum resistance to abrasion and cutting by sharp rocks.

*Thermine* Air Hose is mandrel-built from  $\frac{1}{4}$ " to  $1\frac{1}{2}$ " inclusive in 50 ft. lengths. Available at your nearest Thermoid Distributor.

*Thermoid Quality Products: Transmission Belting • F.H.P. and Multiple V-Belts • Conveyor Belting • Elevator Belting • Wrapped and Molded Hose • Molded Products • Industrial Brake Linings and Friction Materials.*

**For Complete Satisfaction Specify Thermoid!**

**Thermoid  
Company**

Main Offices and Factory • Trenton, N. J., U. S. A.  
Western Offices and Factory • Nephi, Utah, U. S. A.  
Industrial Rubber Products • Friction Materials • Oil Field Products

# Rocky's NOTES

Nathan C. Rockwood

## Review of Long-Time Concrete Experience

WHEN AN ENGINEERING ORGANIZATION has had as many years of integrated experiment and experience with concrete as has the U. S. Bureau of Reclamation, we may be sure that a summary in readable and usable form is worth careful study by all who have anything to do with cement, aggregates and concrete. Such a summary is the recently issued Fifth Edition of the Bureau's "Concrete Manual."\* The previous Fourth Edition was printed in 1942, and everyone interested in concrete knows that much has been added to experience and to the literature since then—and the Bureau of Reclamation has been in the forefront of learning a great deal about cement, aggregates and concrete in these last eight years.

The book appears to be largely re-written, and much more space is devoted to the shortcomings of cement and concrete than in prior editions. Indeed, considerable space is devoted to "repair" of both new and old concrete. Something like 50 pp. have been added to the book as a whole. The Manual, of course, is intended primarily as a textbook for the Bureau's own engineering employees, but previous editions have proved it to be one of the best, practical handbooks for all engineers engaged in concrete construction practice, and incidentally, of course, to producers and manufacturers of the cement and aggregates.

### Cements

Engineers of the Bureau of Reclamation have been quite critical of portland cements in various engineering society proceedings, and it is interesting to see what is recorded in this official government document. They are still convinced that the safest cement is one low in alkalis and prefer it whenever obtainable as the most satisfactory way of preventing or controlling reactivity of aggregates. They say it has other virtues as well, such as prevention of surface crazing, checking and cracking. The 0.60 percent present limit on combined alkalis, it is said, may not be

sufficiently stringent. The alternative method of reducing alkali-aggregate reaction by use of a pozzolan replacement of some 20 to 30 percent of the cement is considered to be still in an experimental stage.

According to the Bureau's experience, Type IV (low heat) portland cement comes nearer the ideal for mass concrete than any other kind of portland cement. This cement is characterized by low tricalcium silicate ( $C_3S$ ) low tricalcium aluminate ( $C_3A$ ) and high dicalcium silicate ( $C_2S$ ) components; and concrete made with it is slower in gaining strength, but ultimate strengths are high and it is tougher and more resistant to weathering. The Type V (sulfate-resisting) portland cement is considered good for certain structures, but the replacement of alumina with iron oxide to reduce the tricalcium aluminate content, resulting in high  $C_3A$ , according to Bureau experience, merely adulterates the cement since the  $C_3A$  is of little or no cementing value.

The comments on the fineness of portland cements contains, it seems to us, a rather curious anomaly. It is stated: "Use of cements having a specific surface less than 1600 (Wagner turbidimeter) may result in poor concrete workability and excessive bleeding (water gain at top of concrete due to settlement of solids prior to initial set). Bleeding often causes unsightly sand streaking on concrete surfaces. The amount of mixing water required has been observed to be less for cements having specific surface greater than 1600. Greater fineness improves the strength, watertightness, workability, and appearance of the concrete. However, recent tests and investigations indicate that the durability of concrete is lower when finely ground cement is used."

This says, in so many words, we can sacrifice durability to prevent bleeding and for workability, exterior appearance, high early strength and alleged watertightness of the concrete. We think the term "watertightness" should be defined. If it means the concrete is less permeable it is one thing; if it means, as we suspect it does, a concrete with very fine pores and capillaries, so small that while

you cannot force water through them, the concrete will nevertheless adsorb (or absorb, if you prefer) and retain a large amount of moisture. And it may well be that this kind of "absorptive" concrete is the least durable. The Bureau engineers have put much stress elsewhere in this book on the significance of kind and size of pores and capillaries in aggregate; they should be able to see the parallel in the case of the hardened cement matrix or paste or gel.

### Pozzolans

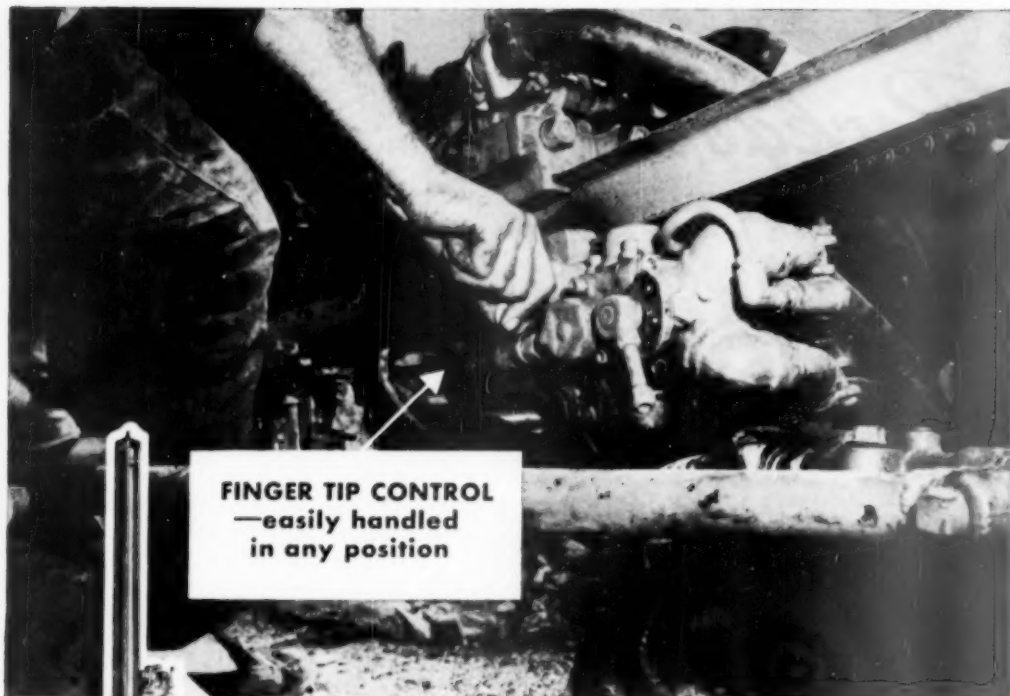
The Bureau of Reclamation, at present anyhow, is leaning strongly on the use of pozzolans to overcome some of the various shortcomings of portland cements. Eventually it is expected not only to save costs by saving in cement, but to make better concrete. It is stated: "Substitution of pozzolan for a considerable portion of portland cement not only results in a low cement content which, in itself is highly desirable, but also compensates for any undesirable characteristics of the concrete that would be introduced if the cement content were similarly reduced without addition of the pozzolan. Caution must be used in selection and use of pozzolan and portland-pozzolan cements, because their properties are widely variable and some introduce adverse qualities into the concrete such as excessive drying shrinkage and reduced strength and durability."

### Aggregates

The Bureau seldom if ever makes its own aggregates, and the text on processing is rather weak. However, aggregate producers can get a good insight into what is expected of their products from the list of qualities that they must possess and tests that are made to determine these qualities. It is stated: "The samples of aggregate shipped to Denver are tested to establish their quality. Grading, unit weight, specific gravity, absorption, silt content, and organic impurities are determined. The samples are also analyzed petrographically, and are tested for soundness as measured by the sodium sulfate test, for toughness and abrasion resistance in the Los Angeles abrasion machine, and for potential reactivity with the alkalis in cement by chemical test. In addition to these ordinarily applied tests, the ability of the aggregate to make durable concrete is tested by subjecting specimens of concrete containing the aggregate to repeated cycles of freezing and thawing and wetting and drying."

The new specification for gradation of fine aggregate appears about as difficult to interpret as the Army Engineer specification. It is given as limiting percentages in each size group, but in such a way that neither column adds up to 100, and the mean of the two, which logically should be the perfect gradation, adds up to only 90 percent!

\*Obtainable either from the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C., or the U. S. Bureau of Reclamation, Denver, Colo., for \$1.75.



**FINGER TIP CONTROL**  
—easily handled  
in any position



*The PIONEER and still the LEADER!*

# JOY LIGHTWEIGHT WAGON DRILL

Introduced by JOY  
8 years ago—hundreds  
in use, nation-wide . . .

*HERE'S WHY:*

- MORE HOLE PER SHIFT with the exclusive "drill and blow" feature.
- REALLY LIGHTWEIGHT—only 750 lbs.—less than half the weight of conventional wagon drills.
- Easily operated by ONE MAN; mounts JOY 3" or 3½" drifters, or 55 or 65 lb. sinkers.
- POSITIVE LOCKING BRAKES—requires no spikes.

WRITE FOR BULLETIN

WAD C-2073



*Consult a  
Joy Engineer*

## JOY MANUFACTURING COMPANY

GENERAL OFFICES: HENRY W. OLIVER BUILDING • PITTSBURGH 22, PA.

IN CANADA: JOY MANUFACTURING COMPANY (CANADA) LIMITED, GALT, ONTARIO

# LABOR RELATIONS TRENDS

## Florida "Right-to-Work" Decision

By NATHAN C. ROCKWOOD

THE CASE of the Illinois coal miner, president of his local union, who was fined \$50,000, and prevented from returning to his mine job, by the United Mine Workers' union because, it is alleged, he accepted John L. Lewis' published telegram to return to work as bona fide, is bringing into the limelight the inalienable right of an individual to earn his livelihood in his own way. How this case is disposed of by the National Labor Relations Board, the U. S. Department of Justice and the Federal Courts will have immense bearing on the most vital domestic issue before our country today. For involved in this issue, of course, is the right of every man or woman to earn an honest living in a job or profession for which he is experienced or best qualified. It is really the issue of the closed-shop, which is now illegal under the Taft-Hartley Act, and by legislation and constitutional amendment in several of the states. Whether or not it is covered by specific federal or state legislation, the issue would appear to be covered by common law because it involves such a basic human right that it would seem impossible to ignore it in a civilized country.

### Building Trades' Case

The building trades' unions of the American Federation of Labor are notorious for their closed-shop operations regardless of law, which is the chief reason why the Federation so violently opposes the Taft-Hartley Act. A recent case decided by the Supreme Court of the State of Florida is of especial interest because it involved a favorite labor tactic of picketing buildings being served by a non-union contractor in an attempt to compel him to sign a closed-shop union contract. There was no violence and no mass picketing, so the issue was devoid of some of the features that have given prominence to other cases. The court's decision is so clear and potent on the fundamental issue that it should give encouragement to employers everywhere.

The lower court had issued an injunction against the local of the plumbers' union to cease picketing two buildings where the plumbing contractor was installing fixtures with his own employees, who were paid the current union wages and did not wish to join the union. Hence, the employing plumber refused to enter a closed-shop union contract. The union appealed to the high court to remove the injunction.

The union claimed the picketing was being done in a "peaceful, peaceable, reasonable manner," and not "en-

masse," or so as to occasion "imminent or aggravated danger;" that the men engaged in picketing were not accosting the contractor's employees or other persons; that they were not blocking the entrances or exits of the jobs in question and were not resorting to any form of coercion, force, violence, intimidation or threats.

The basic question at issue was the union's contention that the injunction denied it the constitutional guarantee of freedom of speech. The "freedom of speech," in addition to the peaceful picketing, involved carrying signs and umbrellas with slogans to the effect that the plumbing contractor was unfair to the union. In addition there was the issue of violation of the Florida laws and constitution. The employing contractor contended that (1) under the conceded facts the exclusive closed-shop contract proposed by the union was illegal under Florida statutes of 1941, and of a Declaration of Rights in the state constitution; (2) if he should enter into such an agreement he would become a party to a contract against the settled public policy of the state and one which would subject him to civil and criminal penalties in the event he attempted to abide by it; (3) inasmuch as the admitted facts clearly disclosed that the picket line established by the union was "against the property of another and not against nor upon the property whereon is located and established the contractor's place of business," the picket line was being maintained in violation of the laws of Florida; (4) because of the foregoing facts, the picketing being conducted by the union was for an unlawful object and hence was enjoined.

### Florida Laws

The Florida statute of 1941 of course antedates the federal Taft-Hartley Act. In fact it may be said to have anticipated that Act, because while its intent, as with the federal Wagner Act, was to insure the right of labor to organize and bargain collectively, the state legislature had the foresight to include certain sections for the protection of the public interest. Thus, one section makes it unlawful for any person "to coerce or intimidate any employee in the enjoyment of his legal rights, including those guaranteed in another section of this Act; to picket beyond the area of the industry within which a labor dispute arises." Another section of the same Act makes it a misdemeanor, punishable by fine and imprisonment, to violate any section of the Act.

In 1943, also antedating the Taft-Hartley Act, the Florida legislature

enacted a statute, a part of which reads: "Because of the activities of labor unions affecting the economic conditions of the country and the state, entering as they do into practically every business and industrial enterprise, it is the sense of the legislature that such organizations affect the public interest and are charged with a public use. The working man, unionist or nonunionist, must be protected. The right to work is the right to live. It is here now declared to be the policy of the State, in the exercise of its sovereign police power, to regulate the activities and affairs of labor unions, their officers, agents, organizers, and other representatives, in the manner and to the extent set forth."

In November, 1944, again antedating the federal Taft-Hartley Act, a constitutional amendment was adopted incorporating a Declaration of Rights, which among other things states: "The right of persons to work shall not be denied or abridged on account of membership or nonmembership in any labor union, or labor organization; provided, that this clause shall not be construed to deny or abridge the right of employees by and through a labor organization or labor union to bargain collectively with their employer."


These laws would appear to be but a reaffirmation of common law rights of the individual, with special provision to assist labor to bargain collectively, and, Florida being the home state of Senator Pepper, it may be assumed that these laws were intended to aid members of labor unions as well as all other people who work.

### Court's Decision

The Florida Supreme Court could find no basis for the union's contention of abridgement of freedom of speech. It quoted a recent decision of the United States Supreme Court in a similar case, in part as follows: "Under the state policy adopted by these laws, employers must, other considerations being equal, give equal opportunities for remunerative work to union and non-union members without discrimination to either\*\*\*\*. Nothing in the language of the laws indicates a purpose to prohibit speech, assembly, or petition. Precisely what these state laws do is to forbid employers acting alone or in concert with labor organizations deliberately to restrict employment to none but union members."

The Florida Supreme Court decision follows, in part: "In the fact of the fixed policy of this State as asserted in the constitutional provision and statutes we have quoted, the defendant union sought a closed-shop contract from an employer who did not wish to employ union labor exclusively, and whose employees were perfectly satisfied with the wages, hours and conditions under which they were working and had no desire to become affiliated with the union, or to designate it as their bargaining representa-

(Continued on page 164)



# COLONIAL Stone and Sand Co., Inc.

*uses*

# TELSMITH®

Scalping-Crushing

Washing-Sizing

## TELSMITH Equipment in this Plant

Two 4' x 12' Two-Deck Pulsator  
Scalping Screens

Two 48" Gyrasphere Crushers

Eight 4' x 10' One-Deck Vibro-King  
Dry Screens

Three 4' x 14' Two-Deck Vibro-King  
Wet Screens

Three 60" x 9' Super Scrubbers

Six 4' x 12' One-Deck Vibro-King  
Wet Screens

Nineteen 24" x 15" Special Tunnel Gates

Fourteen Field and Plant Conveyors—  
18", 24", 36", 42" wide,  
total length about 3000'

● COLONIAL of NEW YORK CITY and LONG ISLAND own and operate this modern all-steel sand and gravel plant. Designed in close co-operation with Telsmith engineers, plant layout and machinery is of the latest type, properly co-ordinated and balanced for flexibility and capacity, with interlocking features to assure smooth, trouble-free operation.

Production averages about 600 cu. yds. per hr., making four kinds of material: minus 1 1/4" plus 1/4" crushed and uncrushed gravel mixed, minus 1/2" plus 1/8" grits, minus 1/8" sand, all washed; and minus 1/8" dry sand. Most of the material is loaded into barges for shipment to New York. A truck-loading plant handles local demands.

In Scalping-Crushing Unit, two 2-deck Pulsators are in closed circuit with two 48" Gyrasphere Crushers which reduce all gravel to minus 1 1/4". In the Dry Screening Plant eight special Vibro-King Dry Screens produce the dry sand. Washing-Sizing Unit has two batteries of Vibro-King Screens—two-deckers ahead, with single-deckers following the Super Scrubbers. Get Bulletin 266 describing Telsmith Complete Plant Service.

G-18

SMITH ENGINEERING WORKS, 509 E. CAPITOL DRIVE, MILWAUKEE 12, WISCONSIN

Cable Address: Sengworks, Milwaukee

51 East 42nd St. 211 W. Wacker Dr. 713 Commercial Trust Bldg. 238 Main St. Interstate Eght. Co.  
New York 17 Chicago 6, Ill. Philadelphia 2, Pa. Cambridge 42, Mass. Statesville, N.C.

Rish Equipment Co. Bish Equipment Co. Wilson-Wheeler-Wilkinson Co.  
Charleston 22, S.C. & Clarksburg, W. Va. Roanoke 7, & Richmond 10, Va. Knoxville 8, & Nashville 6, Tenn.



# the *Personal Side* of the news

## Joins Slag Association

SETH T. REESE, JR., has joined the staff of the National Slag Association, Washington, D. C., in the capacity of engineer and administrative assistant.



Seth T. Reese, Jr.

His duties will consist of working with members in the field on engineering problems and assisting E. W. Bauman, managing director, in Washington, D. C. Following his services with the Army Engineers in England, France and Germany during World War II, Mr. Reese entered Maryland University, graduating in February, 1950, with a B.S. degree in civil engineering.

## Safety Meeting Chairman

S. A. GRETENCOURT, manager of the Portland, Colo., plant of the Ideal Cement Co., Denver, Colo., was chairman of the cement industry safety meeting held recently in Denver and attended by more than 40 men from cement plants in Colorado, Nebraska and Wyoming. This was the eleventh in a series of 21 meetings to be held in the United States and Canada. Other Denver cement company officials attending the meeting were Cris Dobbins, executive vice-president and general manager, and Thomas B. Douglas, general superintendent, of the Ideal Cement Co., and S. W. Russell, vice-president and sales manager of Monolith Portland Midwest Co.

## C.I.A.C. Chairman

CARLTON S. PROCTOR, consulting engineer, New York, N. Y., has been elected chairman of the Construction Industry Advisory Council, Washington, D. C., for the year 1950-1951. He succeeds James R. Edmunds, Jr., of Baltimore, Md., a past president of

the American Institute of Architects. Mr. Proctor, who has served as vice-president and director of the American Society of Civil Engineers, has been connected with the design of many buildings, dams, bridges, and other engineering works in North and South America and in Russia.

## Assists Operations Manager

VERNON O. BURKHALTER has been appointed assistant operations manager of the building products division of Great Lakes Carbon Corp., New York, N. Y. He will be in charge of all Eastern division operations, including the Permalite lightweight aggregate plant at Linden, N. J., and the Great Lakes Fire-Safe Insulation plant at Easton, Penn. Mr. Burkhalter is a graduate metallurgical engineer and has had 16 years of production management experience. He will make his headquarters at Linden, N. J.

## U. S. Visitor

T. L. WEBB, of the South African Council for Scientific and Industrial Research, Pretoria, Union of South Africa, was a visitor to ROCK PRODUCTS' office late in March. Mr. Webb came to the United States as a representative of an organization somewhat similar to the U. S. Bureau of Standards, in order to develop information on lime for plaster. He states that the lime industry in his country must manufacture plastering lime from dolomite, and he is seeking better methods of manufacture for the purpose of improving the final product. Mr. Webb attended the National Lime Association convention, Hot Springs, Va., where he presented a paper.



T. L. Webb

## General Manager

THURMAN MANLEY has been appointed general manager of the Nashville, Tenn., plant of the Universal Concrete Pipe Co., Columbus, Ohio.



Thurman Manley

For the past six years he has been sales representative and office manager at the plant.

## Construction Engineer

JAMES L. TAYLOR, chief engineer of the Wales, Tenn., potash mine and refinery of International Minerals and Chemical Corp., Chicago, Ill., has been appointed construction engineer and will make his headquarters in the Chicago office.

## Board Members

DONALD B. LOURIE, president of Quaker Oats Co., and Charles M. Hines, president of Hines Lumber Co., have been elected members of the board of directors of United States Gypsum Co., Chicago, Ill.

## Assistant Manager

THOMAS J. GRIFFETH has been appointed assistant plant manager at the Fairborn, Ohio, plant of Universal Atlas Cement Co., New York, N. Y. He was formerly maintenance engineer at the Hannibal plant. Mr. Griffeth graduated from the Missouri School of Mines, Rolla, Mo., in 1940, with a B.S. degree in mechanical engineering. He joined the Hannibal plant in 1945 as mechanical engineer and was appointed supervisor of safety and personnel in 1947. Two years later he was made maintenance engineer.

## A.C.I. Officers

FRANK H. JACKSON, new president of the American Concrete Institute, and principal engineer of tests, Bureau of Public Roads, Washington,



Frank H. Jackson

D. C., has been an active member of the Institute since 1924 and a vice-president since 1948. He has served on technical and administrative committees and has been the author or co-author of seven papers published in the *A.C.I. Journal*. Mr. Jackson was awarded, with Harold Allen, the Wason Medal for the most meritorious paper in 1948 on "Concrete Pavements on the German Autobahnen." He is a member of the Technical Activities Committee and was a member of the Advisory Committee from 1929 to 1946; Program Committee from 1938 to 1940; Publications Committee from 1941 to 1946; and a member of the Board of Direction, 1937-38 and 1945-47.

A. T. GOLDBECK, vice-president of the Institute, and engineering director of the National Crushed Stone Association, Washington, D. C., has been a director of A.C.I. since 1948, and is a member of committees on research, pavements, design of mixes and aggregates. He has been an active A.C.I. member since 1922, a member of the Advisory Committee, 1922-23, and Publications Committee, 1944-46. He also has had many papers published.

A. E. CUMMINGS, newly-elected director of A.C.I., is director of research, Raymond Concrete Pile Co., New York, N. Y. He has been a member of the Institute since 1924, and is chairman of Committee 323, Prestressed Reinforced Concrete.

I. L. TYLER, manager of field research, Portland Cement Association, Chicago, Ill., and newly-elected director of the Institute, is a member of the Technical Activities Committee. He has had several papers published in the *A.C.I. Journal* and is a member on five of the technical committees and is chairman of Committee 621, Aggregate Selection, Preparation, Handling and Use.

CHARLES L. WHITNEY, newly-elected director of the Institute, and consulting engineer with Ammann & Whitney, New York, N. Y., and Milwaukee, Wis., was awarded the Wason Medal for the most meritorious paper in 1932 for "Plain and Reinforced Concrete Arches," and has been an A.C.I. member since 1920. He was a member of the Board of Direction, 1945-46, and is chairman of Committee 312, Plain and Reinforced Concrete Arches, as well as a member of the committee on compression tests of field concrete.

C. H. WUERPEL, technical director, Marquette Cement Mfg. Co., Chicago, Ill., and newly-elected director of the Institute, is a member of A.C.I. committees on research, compression tests of field concrete and winter concreting. He was awarded the Wason Medal for noteworthy research for the work reported in his 1946 paper "Laboratory Studies of Concrete Containing Air-Entraining Admixtures."

## 25 Years of Service

EDWARD M. HENDERSON, salesman for the North American Cement Corp., New York, N. Y., has been presented with a gold watch in recognition of 25 years of service with the company. The presentation was made by Roy S. Adkins, vice-president and general sales manager, at a meeting of the sales group in Albany, N. Y. Mr. Henderson has been associated with the cement industry for 40 years.

## Sales Managers

EDWARD A. WEYMOUTH, engineer of sales for the Pittsburgh Limestone Corp., Pittsburgh Corp., Pittsburgh, Penn., has been appointed manager of sales, and Arthur H. Paden, office manager of the sales department, has been named assistant manager of sales. After graduating from Pennsylvania State College in 1920, Mr.



Arthur H. Paden



Edward A. Weymouth

Weymouth served for nine years as junior civil engineer with the United States Forest Service and later as engineer with the Pennsylvania Department of Highways. He has been associated with Pittsburgh Limestone Corp. since 1939 in sales engineering and since 1944 has been engineer of sales. He is a member of the American Concrete Institute, Engineers Society of Western Pennsylvania, and the Pennsylvania Crushed Stone Association.

Mr. Paden started his business career as a clerk with the Pennsylvania Railroad and the Pittsburgh and Lake Erie Railroad, joining the Pittsburgh Limestone Corp. in 1921 in a clerical capacity. He was made office manager of the sales department in 1944.

## Talks on Concrete

ROLLA D. KING, structural engineer in the Tulsa, Okla., office of the Portland Cement Association, Chicago, Ill., recently gave a talk on "Modern Developments in Reinforced Concrete" at a meeting of the American Society of Civil Engineers in Tulsa. A native of Oklahoma, Mr. King attended Oklahoma Agricultural and Mechanical College, Stillwater, Okla., and for the past five years has been a structural engineer for the Portland Cement Association.

## Special Salesman

GEORGE ELLIOTT, sales representative in the Fresno area of the Calaveras Cement Co., San Francisco, Calif., has been appointed special salesman in the Western states for the company's recently re-introduced white portland cement. He will make his headquarters in San Francisco. ERNEST ROHR has been named to succeed Mr. Elliott as representative in Fresno, and CHARLES H. LAUGHLIN has been appointed sales representative in Modesto.

## Retires

ROBERT T. HASLAM, vice-president and a director of Standard Oil Co. (New Jersey), has asked that he not be nominated for re-election as a director at the annual meeting June 7. Dr. Haslam said he plans to retire in the Fall, but that until retirement he will continue as a vice-president of the company. His career in the oil business has ranged from research to sales and public relations. Dr. Haslam is remembered by old-timers in the lime industry as a professor at Massachusetts Institute of Technology who during the early 1920's did valuable research work on lime for the National Lime Association.

## Lectures on Concrete

CARLOS D. BULLOCK, regional structural engineer in the Kansas City, Mo., office of the Portland Cement Association, Chicago, Ill., recently gave an illustrated lecture in Topeka, Kan., on methods of construction with prestressed reinforced concrete, at a meeting of the Kansas Section of the American Society of Civil Engineers.

## Association Officers

HUGH L. SHERWOOD, Western Concrete Products Co., Lincoln, Neb., has been elected president of the Nebraska Concrete Masonry Association. Other officers are J. L. Bergman, president of the Omaha Concrete Stone Co., Omaha, vice-president; Gene Tallmann, Lincoln, secretary; and A. V. Johnson, president and treasurer of the Ideal Cement Stone Co., Omaha, treasurer.

## Heads Concrete Firm

JAMES M. CRANZ has been elected president and treasurer of the Stone-Mix Concrete Corp., Buffalo, N. Y. Allen Brehm has been named vice-president and director, and William G. Shoemaker, Jr., has been appointed secretary and assistant treasurer. Franklin P. Taylor, Jr., continues as sales manager, and Roy B. Taylor as plant manager.

## General Chairman

FREDERICK W. REINHOLD, president of Anchor Concrete Products, Inc., Buffalo, N. Y., has been named general chairman of the 1950 Cancer Crusade of the Erie County Chapter of the American Cancer Society.

## Transferred

CLYDE WILSON, superintendent of the Columbus plant of the Universal Concrete Pipe Co., Columbus, Ohio, has been transferred to the plant at Nashville, Tenn., to replace HERMAN

LAWRENCE, superintendent, who has been transferred to the plant at Decatur, Ala. A. E. MORRIS, superintendent at Decatur, has been transferred to the Atlanta, Ga., plant.

## Named Director

DAVID E. JONES, attorney, has been elected a director of the Bessemer Limestone and Cement Co., Youngstown, Ohio, to succeed the late Charles F. Smith, and A. E. ADAMS, vice-president of the Union National Bank, has been named a member of the executive committee.

## Prize for Kiln Burner

DR. STEVEN GOTTLIEB, a cement chemist, now with Cement and Lime Works, Melbourne, Australia, in a recent letter to the editors, expressed surprise and appreciation for receiving a check in payment for his comments on firing kilns with anthracite fines. He writes that he has awarded the money as a prize for the best kiln burner in his plant.

## Assists President

GEORGE DONALDSON has been appointed assistant to Frank Thacher, president of the Carbon Limestone Co., Lowellville, Ohio. Mr. Donaldson was formerly vice-president and general manager of the Machined Steel Casting Co. which recently closed operations.

## Assistant Manager

GEORGE H. DONALDSON has been appointed assistant general manager of The Carbon Limestone Co., Youngstown, Ohio. He was formerly vice-president and general manager of The Machined Steel Casting Co., Alliance, Ohio, which discontinued operations in March of this year.

## A.E.D. Secretary

FRANK G. KNIGHT has resigned as executive secretary of Associated Equipment Distributors, Chicago, Ill., to become executive assistant in the Remiss Equipment Corp., Richmond, Va. P. D. Hermann, who joined A.E.D. in 1948 as administrative assistant has been named to succeed Mr. Knight.

## Correction

AN OBITUARY item on page 83 of the January issue mentioned Clarence B. Hoover as author of the National Lime Association book on Water Treatment. The author of this book is Charles P. Hoover, superintendent of the Columbus, Ohio, water department and an authority on municipal water supply.

## Officers Re-elected

CHAUNCEY C. LOOMIS has been re-elected president of the New England Lime Co., Adams, Mass., for the 20th year. Other officers re-elected are David Follett, vice-president; R. J. Pierson, treasurer; and Lawrence Connor, clerk. Mr. Loomis and Mr. Connor are also directors of the company.

## Retires as Director

WILLIAM G. MATHER, honorary chairman of Cleveland-Cliffs Iron Co., has retired as a director of Medusa Portland Cement Co., Cleveland, Ohio, a post he has held for 22 years, and will be succeeded by A. Dean Perry, treasurer of Harshaw Chemical Company.

## Farm Bureau Agent

ALLEN RISINGER has been appointed agricultural and farm bureau agent for Marion County, Kansas, to succeed Carl Elling, who has accepted a position as head of sales and field operations for Riddle Quarries, Inc., Marion, Kansas.

## OBITUARIES

HENRY MCCLARNAN, pioneer cement executive and retired general superintendent of the Alpha Portland Cement Co., Easton, Penn., died suddenly on February 7 at his home in LaSalle, Ill. He was 71 years old. Born in St. Paul, Kan., in 1878, Mr. McClarnan started his career in the cement industry in 1901 with the Iola Portland Cement Co. and later with the Ash Grove Lime and Cement Co. In 1913 he joined the Marquette Cement Co. in Oglesby, Ill., as assistant to Richard Moyle, superintendent at that time. Shortly after World War I, Mr. McClarnan became superintendent of the German-American Cement Co. plant in LaSalle, Ill., which was later acquired by Alpha Portland Cement Co. Later he was appointed general superintendent of the Western division, directing the plants at Ironton, Ohio, St. Louis, Mo., and LaSalle, Ill., until his retirement in August, 1949.

FRANCIS M. TAYLOR, chief engineer of the Birmingham Slag Co., Birmingham, Ala., died on March 25. Born in Tuscaloosa, Mr. Taylor graduated from Auburn in 1917, and served in the Rainbow Division during World War I. He was well known throughout the South as an engineer in design and operation of slag and aggregate producing plants.

HARRY E. MILLARD, president of the H. E. Millard Lime and Stone Co., Annville, Penn., passed away on March 17.

# MORE WORK AT LOWER COST



## Keep engines clean and efficient with **TEXACO URSA OIL X\*\***

**A**SSURE trouble-free engine performance, and you'll get more work and longer working life from your machines. Maintenance costs and fuel consumption will be less, too. Use *Texaco Ursa Oil X\*\**—the fully detergent and dispersive oil that cleans as it lubricates. Ideal for both heavy-duty gasoline and Diesel engines.

*Texaco Ursa Oil X\*\** strongly resists oxidation. This means rings stay free, valves act properly because engines are cleaner. *Texaco Ursa Oil X\*\** stands up under heat and pressure . . . gives full protection at all times . . . guards bearings against corrosion . . . assures longer life for moving parts.

## Reduce Other Maintenance Costs

Use *Texaco Marfak* in chassis bearings—get extra hundreds of miles of protection, longer life for all chassis parts.

In wheel bearings, use *Texaco Marfak Heavy Duty*. It seals out dirt and moisture, requires no seasonal change.

Protect crawler track mechanisms with *Texaco Track Roll Lubricant*. It's remarkably long lasting, seals mechan-

isms against water and dirt, reduces wear.

Texaco has a Simplified Lubrication Plan that's a real money saver. Ask your Texaco Lubrication Engineer for full details. Just call the nearest of the more than 2,000 Texaco Wholesale Distributing Plants in the 48 States, or write The Texas Company, 135 East 42nd Street, New York 17, N. Y.



## TEXACO Lubricants and Fuels

TUNE IN . . . TEXACO STAR THEATER starring MILTON BERLE on television every Tuesday night. See newspaper for time and station.



# INDUSTRY *News*

## General Portland Cement Expansion

GENERAL PORTLAND CEMENT CO., Chicago, Ill. plans to continue its program of expansion and improvement of its properties in 1950, according to Smith W. Storey, president. The Dallas, Texas, plant is to be substantially improved, initial construction being already under way and orders placed for machinery and equipment. It is expected the new equipment will be in operation by fall. Improvements will continue at mills located at Houston and Fort Worth, Texas; Tampa, Fla., and Chattanooga, Tenn.

Since the organization of the company on February 19, 1947, expenditures for the improvement program have totaled approximately \$5,200,000. These continuing improvements, according to Mr. Storey, have increased the company's annual productive capacity for standard Type I portland cement from 6,635,000 bbl. at the beginning of 1947 to 8,885,000 bbl. at the end of 1949.

## Company Sold

UNION ROCK AND MATERIAL CO., Phoenix, Ariz., was sold to K. G. Benson, president of the Bentonson Contracting Co. Mr. Benson said his newly organized firm will specialize in the manufacture of concrete block for all types of buildings, marketing of ready-mixed lime mortar, and eventually transit-mixed concrete. The transaction was reported to have involved \$200,000.

## Leases Granite Quarry

WESTON-BROOKER CO., Columbia, S. C., has leased the Duggan granite quarries at Granite Hill, S. C., for a period of 20 years. According to reports, the company expects to install machinery at the location which will make the operation one of the largest granite crushing plants in the South. The company has been operating plants at Camak, Ga., and Columbia, S. C., for a number of years.

## New Cement Plant to be Erected

LONE STAR CEMENT CORP., New York, N. Y., has announced plans to construct a new cement plant near Roanoke, Va. This plant, to be erected at a cost of \$6,000,000, is to have an

annual productive capacity of 1,500,000 bbl. of cement. It should be in operation early in 1951. The Lone Star firm has for many years operated a plant at Norfolk, Va., and the new mill will make additional cement available economically to Virginia and Carolina areas. Completion of the plant will bring to 16 the total number of mills in the Lone Star system, with an annual capacity of 29,000,000 bbl. of cement.

## Gypsum Plant Expansion

UNITED STATES GYPSUM CO., Chicago, Ill., has announced plans for the expansion and improvement of its plant at Fort Dodge, Iowa. Construction will start immediately and is scheduled to be completed this fall. The plant produces wallboard, plaster, plaster base, sheathing, and other building materials.

## Reopens Quarry

MACON STONE CO., Macon, Ga., has begun work at its recently reopened quarry on Georgia Industrial Home property. Approximately \$225,000 worth of equipment has been put into operation at the site of the old quarry. W. W. Williams, head of the concern, said the quarry will remain open "indefinitely."

## Safety Award

PERMANENTE CEMENT CO., Oakland, Calif., is winner of the Kaiser Cup, awarded annually for outstanding safety achievement by the Henry J. Kaiser companies. The Kaiser Cup contest is conducted according to rules laid down by the National Safety Council. Permanente's percentage figure represents a marked reduction, compared with the 1948 record, in the frequency and severity of the company's industrial accidents.

Second place honor in the Kaiser Cup competition went to Kaiser Gypsum division of Kaiser Industries, Inc., which operates plants at Redwood City and Long Beach.

## New Type Gypsum Cement

CERTAIN-TEED PRODUCTS CORP., Ardmore, Penn., is producing a new gypsum cement called Densite, making possible the fabrication of pure gypsum plaster casts having compressive strengths of from 10,000 to 15,000 p.s.i. The product has the property of requiring less mixing water than other pure gypsum cements. Densite is available in two grades, industrial and low expansion. The latter material is recommended for applications requiring casts having a high degree of dimensional stability.



Ponce Cement Co., located in Puerto Rico, uses the fleet of White trucks shown for all quarry and finished product hauling. The company was organized in 1941 with one kiln producing 4000 bags of cement a day. Daily capacity has recently been raised to nearly 30,000 bags of cement from four kilns. The plant produces enough in excess of domestic needs to export a substantial amount to Caribbean countries.



## A.S.T.M. Declares "Airalon" Acceptable

AMERICAN SOCIETY FOR TESTING MATERIALS, in keeping with the policy of the society and its Committee C-1 on cement, has announced that the air-training agent known as "Airalon" has been declared acceptable as an addition to the cements covered in Tentative Specifications C 175 T and C 205 T. The recognition comes after completion of suitable tests and review of existing data by the committee. The present specifications mentioned above will include, in their next revision, footnote references to this latest addition to portland cement. The material is manufactured by the Dewey & Almy Chemical Co., and consists substantially of hydroaromatic and fatty carboxylic acids, being derived from an alkaline process of paper manufacture and neutralized to make a water-soluble soap. The acids, if regenerated from the soap, have an acid number of 150 to 160.

## New Sand Plants

A. ZALZNECH & SONS have opened their sand plant near Corry, Penn., to serve contractors in Erie county and surrounding counties.

C. S. SEIDLE SAND & GRAVEL Co is now operating a sand plant in Freedom, Penn.

HERBERT HASBRAUCK SAND & GRAVEL Co., Titusville, Penn., has opened a sand plant to serve contractors in Crawford and nearby counties.

MOYERS BROS. SAND & GRAVEL Co., Conneaut Lake, Penn., is operating a sand plant near Conneaut to furnish material for contractors in the Crawford county area.

## Modernization Program Launched

PACIFIC PORTLAND CEMENT Co., San Francisco, Calif., is currently spending approximately \$100,000 for a replacement and modernization program at its Redwood City plant. Largest single sum is \$65,000 scheduled for work on the precipitation building; next largest sum is \$17,500 to be expended for the dust-collector system, and \$9,500 for the spray scrubbing unit. This plant is the largest of the company's three Pacific Coast plants, with a daily capacity of 6000 bbl. of cement.

## Cover Picture

THE NEAT AND EFFICIENT PLANT displayed is operated by Inland Aggregates Co., Inc., Niles, Calif. It operates with a minimum of manpower to produce 150 tons of washed sand and gravel per hour. Belt conveyors are used throughout for the transportation and interplant handling of materials.

The plant is designed so that a single operator can see and control the various operations from an elevated and partially enclosed platform.

## Portland Cement Production

THE PORTLAND CEMENT industry produced 13,070,000 bbl. of finished cement in February, 1950, as reported to the Bureau of Mines. This was a decrease of 5 percent compared with the output in February, 1949. Mill shipments totaled 9,775,000 bbl., an increase of 7 percent over the February, 1949, figure, while stocks of 23,562,000 bbl. were 6 percent greater than the total for the same month of 1949. Clinker production during February, 1950, amounted to 14,454,000 bbl., a decrease of 4 percent compared with the corresponding month of the previous year. The output of 13,070,000 bbl. of finished cement during February, 1950, came from 142 plants located in 34 states and Puerto Rico. During the same month of the previous year 13,751,000 bbl. were produced in 144 plants.

## Cement Group Moves

THE ASSOCIATED PORTLAND CEMENT MANUFACTURERS LTD. head office and administrative offices for its subsidiary companies have been moved to Portland House, Tothill Street, Westminster, S. W. 1, England.

## Coming Conventions

May 17-19, 1950—

National Industrial Sand Association, Annual Meeting, The Homestead, Hot Springs, Va.

June 26-30, 1950—

A.S.T.M., 53rd Annual Meeting and Exhibit, Chalfonte-Haddon Hall, Atlantic City, N. J.

July, 1950—

National Slag Association, Mid-Year Meeting, Board of Directors, tentatively set for Buffalo, N. Y.

July 19-20, 1950—

National Agricultural Limestone Association, Midsummer Meeting, Netherlands-Plaza Hotel, Cincinnati, Ohio.

## Moves Phosphate Operations

CORONET PHOSPHATE Co., Plant City, Fla., is moving its mining operations from Hillsborough county to a 3000-acre site six miles northeast of Lakeland, according to B. G. Dabney, vice-president and general manager of the firm. Actual operations at the new mine, to be called Teneroc, will begin sometime next year.

## Opens Gravel Plant

FABERT CONSTRUCTION Co., Urbana, Ill., is building a gravel plant about one mile west of Champaign, Ill. where test borings have revealed the existence of a deposit containing possibly as much as 200,000 cu. yd., of high grade gravel. The company is headed by E. Montelle Fabert, who also is identified with a large construction company operating in Missouri and Southern Illinois.

## Perlite Operation

C. T. HANSON Co., San Francisco, Calif., has purchased the Pearl perlite property near Lovelock, Nev. The Pearl property, believed to contain millions of tons of perlite, has extensive deposits exposed in surface workings. The company is preparing to install a screening plant and drying unit for production of perlite in three sizes, at the rate of 100 tons of material per day.

## Quarry Reopens

O'FALLON QUARRY, located three miles west of O'Fallon, Mo., has been reopened after a seven year shutdown, according to O. E. Wegener who has operated it for 20 years. The quarry, which has been leased to E. W. Hillenkamp and Warren Buescher, will now carry the name O'Fallon Quarry and Supply Co., Inc. Stone contained therein is a part of the Ste. Genevieve vein.

## Seeks Dredging Permit

GIRON Co., Vicksburg, Miss., has made application to the Vicksburg, Miss., district of the U. S. Engineers for a permit to dredge sand and gravel from the Mississippi river at various points along a 13-mile stretch near St. Joseph, La. All materials dredged will be used in the casting of articulated concrete mattress revetment for use in bank stabilization operations of the engineers.

## Buys Lime Plant

R. P. WALSH Co., New York, N. Y., has purchased North American Cement Corp. hydrated lime plant at Berkeley, W. Va., complete with limestone deposits and quarry. The plant will be dismantled and the equipment sold.

## Gravel Exports Prohibited

A FORT FRANCES, Ontario, Canada, contractor, George Armstrong, said the Ontario government has halted his sales of gravel to the state of Minnesota by expropriating a gravel pit from which he intended to export 100,000 cu. yd. of gravel. The move will force him to release a contract he obtained from the Minnesota State Highway Department, Mr. Armstrong said. J. D. Millar, Canadian Deputy Highway Minister, said the pit was taken over by agreement between the government and solicitors for the owners, the Lockhart estate. He added that the highway department needs all the gravel it can get for the proposed highway construction between Fort Frances and the head of the Great Lakes.

## Cement Plant Shipped to Greece

A KNOCKED-DOWN cement plant was shipped to Greece recently on the cargo vessel *Robin Trent*. The plant was consigned by the F. L. Smith Co. of New York to the Geneva Cement Co., Piraeus, Greece. The plant consists of a rotary kiln in ten cylindrical sections 13 ft. in diameter. When assembled the kiln is 400 ft. long. The plant is being paid for with Economic Cooperation Administration funds for the rehabilitation and restoration of Greece.

## Italians Tour Lime Plants

A DELEGATION of six representatives of the Cement Industries of Italy recently visited the Gibsonburg Lime Products Co., Gibsonburg, Ohio, under a government-sponsored tour as part of the Marshall plan. The delegation showed great interest in the large shovels and other equipment used at the plant, stating that the Italian industry contemplates modernizing the 32 quarries represented by the group. Production in the Italian quarries, according to the visitors, is mainly by hand labor.

## Safety Meeting

THE PORTLAND CEMENT ASSOCIATION regional meeting held in Kansas City, Mo., was attended by 60 officials from eight mills and quarries operated by portland cement companies in Kansas, Nebraska, western Missouri, and northern Oklahoma. Safety procedures were discussed. Walter J. Seahill, St. Louis, assistant to the general superintendent of the Missouri Portland Cement Co., presided. George M. Burns, director of the Kansas City safety council, and A. J. R. Curtis, Chicago, safety director of the Portland Cement Association, spoke to the mill superintendents, plant managers, safety directors, quarry fore-

men and others present. The group was urged to maintain the present excellent safety record, some plants having completed 1000 days without a lost-time mishap.

## Purchases Limestone Tract

BETHLEHEM STEEL CO., Bethlehem, Penn., recently announced the purchase of 325 acres of land suitable for a limestone quarry in Chester county, Penn. The new quarry will be developed to supplement production from the company's Bridgeport quarry, according to company officials. The property is adjacent to the Warner Co., Philadelphia, Cedar Hollow quarry.

## Highway Research Board Meeting

THE 30TH ANNUAL MEETING of the Highway Research Board of the National Research Council will be held in Washington, D. C., January 12, 1951, at The National Academy of Sciences. The change from the usual December meeting dates is necessary to avoid conflict with other important meetings involving highway engineers and administrators which are scheduled for December, 1950.

## Adds Soil Consultant

HAYES QUARRIES, INC., Bethany, Mo., has added Cecil Neisz, formerly with the Soil Conservation Service, to its staff as soil consultant. Mr. Neisz will deal with farmers on problems of liming and fertilizing. Jim McInroe will be superintendent of the quarries succeeding K. D. Kinnison, who resigned recently to give all his time to a ready-mixed concrete materials business. The company will also go into the fertilizer business.

## Fire Damages Sand Plant

SHENANDOAH SILICA CO., Gore, Va., was damaged by a \$200,000 fire recently at its sand pulverizing plant. The fire spread so rapidly that it was too late for firemen to save the mill and efforts had to be concentrated on keeping the flames from reaching the adjacent Virginia Sand Corp. property. Virginia Glass Sand Corp., a local industry, reported that it would necessarily have to curtail production until Shenandoah's pulverizer is rebuilt or another outlet is found since Shenandoah was their biggest user.

## Determination of Alkalies in Portland Cement

THE AMOUNT of sodium and potassium oxides in portland cement sets an important limitation on its use for many applications. It is widely believed that alkalies may sometimes react with soluble silica in aggregates in concrete, causing expansion with resulting cracks and weakening of the



The solution to be analyzed is poured in the funnel; it is then atomized into a flame. Light characteristic intensities of each element to be determined are read on the scale beside the funnel.

structure. The National Bureau of Standards, U. S. Department of Commerce, has devised a convenient and practicable analytical procedure to replace the usual time-consuming and painstaking gravimetric procedure. This makes use of the flame photometer. The method has now been adopted by the Federal Specifications Board as an Alternate Standard and by the American Society for Testing Materials as a Tentative Standard for the determination of  $\text{Na}_2\text{O}$  and  $\text{K}_2\text{O}$  in portland cement.

In the method of flame photometry, the solution to be analyzed is atomized into a flame. Light characteristic of each element to be determined is then isolated, and its intensity is measured. In this way the principles of analytical spectroscopy are applied under conditions that allow rapid determinations to be made with relatively simple apparatus by personnel having only moderate training.

## Crushing Plant

A CRUSHING PLANT for the production of high grade agricultural limestone and road and concrete aggregate has been established near La Cygne, Kan., by R. H. Cornelius. Agricultural lime from this plant, according to a report from Kansas State College, tests 98.2 percent calcium carbonate equivalent.

## Pavement Yardage

AWARDS OF CONCRETE pavement for the month of March and for the first three months of 1950 have been announced by the Portland Cement Association as follows:

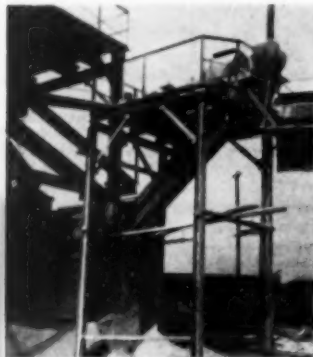
	Square Yards Awarded During March, 1950	During First Three Months, 1950
Roads	2,683,932	8,064,967
Streets and Alleys	2,634,818	4,610,810
Airports	59,591	442,332
Total	5,368,341	11,088,109

# HINTS and HELPS

PROFIT-MAKING IDEAS DEVELOPED BY OPERATING MEN

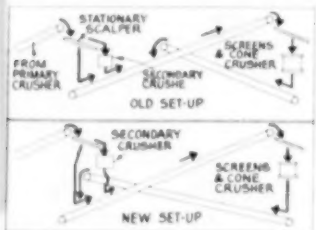
## Adjusting Conveyor for Increased Tonnage

AN AGGREGATES PLANT in North Carolina recently installed a new 48- x 80-in. Allis-Chalmers jaw crusher that



Chute in center delivers back to toe of belt conveyor "A"

can turn out approximately 800 t.p.h. when set to deliver an 8- to 9-in. product. To handle this increased tonnage belt conveyors in the plant had to be



Sketch showing how belt conveyor system was changed to handle increased tonnage

speeded up. Additional hp. was necessary on some. One of the most important changes was made in the conveyor set-up between the secondary and final reduction crushers. Rock, after passing through the secondary crusher, is elevated and split to two Symons cone crushers that discharge to another inclined return belt. Under the old set-up this inclined return belt delivered rock about mid-way onto the feed belt to the cones.

When the new primary crusher was installed it was found that there was too much spill at the point where the rock was returned to the second plant conveyor belt due to change in direction, etc., of the flow of rock. Thus the return belt was extended clear back to the secondary plant and the

rock chuted into the same opening that receives the fines from the stationary scalper screen ahead of the secondary crushers. This change enables the operators to carry an increased load on the belt without spillage.

## Angle Irons Fasten Vibrator to Hopper Car

ANGLE IRONS are welded to the steel-covered hopper section of railroad cars at an Eastern ready-mixed concrete plant with the intention of providing a place for the operators to fasten a large, portable type vibrator to the angle iron with clamps so the car can

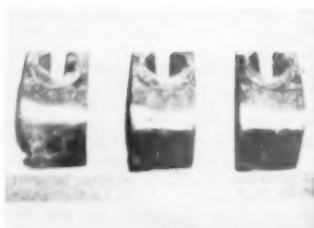


Vibrator which can be fastened to angle iron on hopper cars

be unloaded more quickly and thoroughly. An effort to have hopper cars so equipped is becoming general.

## Hardfacing Saves Wear On Trowler Shoes

HARDFACING WITH Amsco Tube Tungsite 30-40, a tungsten carbide type welding rod, increased the length of usefulness of trowler shoes used in forming the inside surface of concrete



The two trowler shoes on the right were hardfaced with tungsten carbide; the worn shoe on the left was not faced

pipe. The shoes in the photograph were tested for resistance. The two shoes on the right were hardfaced with the tungsten carbide while the shoe on the left was not. The uncoated shoe was so worn that it had to be discarded after three hours of work, while the coated shoes were used for eight hours and then could be rebuilt to original dimensions and returned to service. The saving in replacement parts is considerably greater than the cost of hardfacing, and there is a saving in production time due to less frequent replacement of shoes.

Tube Tungsite, 30-40 mesh, the welding rod used, is a tungsten carbide rod or electrode with carbide particles encased in a tube of mild steel. In welding, the tube casing melts to form a matrix for the carbide particles, creating an extremely wear resistant surface. Tube Tungsite and Tungrod range from 5-8 mesh to 40-125 mesh, and carbide inserts in a wide range of shapes and sizes are available. This method is also used to combat wear in hundreds of widely scattered industrial applications such as crawler parts, dipper teeth and rotary drill bits.



Belt "A" takes rock to screens ahead of final cone crushers. Belt "B" is the extended return belt that goes back to point over toe of belt "A"

### Chains Prevent Throw-Back

THE THROAT of a 40-40 New Holland double impeller primary crusher at a new sand plant in Pennsylvania is provided with a mat of vertically



Chains hanging over the throat of the opening to the impactor prevent throwback

hanging chains so that there is no chance of a piece of rock being thrown out of the unit by the two rotating members that operate in the 1000 r.p.m. (and higher) range. All crushing is done by this impactor and final grinding is done in a rod mill. The material being reduced to sand at this plant is loosely consolidated sandstone which is hauled from the pit by Koehring Dumpsters that unload to the feeder ahead of the impactor. The crusher is driven by two 75 hp. Allis-Chalmers motors through V-belts to each rotating impeller. The chain idea could possibly be used to advantage in other types of reduction units where there is danger from flying rock.

### Dual Purpose Crushing Plant

AT A CRUSHING OPERATION in north-eastern Pennsylvania, sized stone is processed in a new plant with some

sections of the older plant still being used for preparing the finer sizes. At times, however, this older part of the plant plays a dual role and is called upon to process sand and gravel. In this case the old section operates as a separate unit. The concrete sand falls to ground storage from an elevated sand drag as shown in the illustration. Overflow from this drag flows to a second drag which prepares the masons sand. Shown in the foreground of the illustration is an improvised shovel assembled on a Stewart truck, used for reclaiming.

### A Simple and Efficient Surge Pile

A SIMPLE and efficient surge pile that requires little additional equipment to get functioning has been de-



Fig. 1. Dotted lines show approximate position of the reclaiming belt that also serves the primary crusher on the quarry floor; light area is the surge pile

veloped at some operations in the Southeast, where the primary crusher has been moved to the bottom of the quarry and crushed stone from the crusher is elevated to the plant by a belt conveyor system.



Fig. 2. Stub conveyor dumps rock back into the quarry

Fig. 1, taken in North Carolina, shows the primary crusher in the bottom of the quarry. The dotted line indicates approximately where the belt conveyor from it runs. The conveyor operates in a suitable tunnel so that rock for the surge pile is dumped back over the rim of the quarry and over this tunnel. Thus one belt serves the primary crusher and the surge pile. The belt is 42 in. wide and is on 550 ft. centers. It was supplied by the Quaker Rubber Co.

Fig. 2 shows the same general idea carried out, but here a short stub conveyor builds up the surge pile and a second short stub conveyor under the pile returns the rock to the main belt serving the primary crusher that is also mounted on the floor of the quarry.

### Deep Well Pumps in 150-ft. Quarry

DEEP WELL PUMPS are being used in a limestone quarry in the East where drilling must go deeper, since residences, railroads and business establishments surrounding it make the usual horizontal expansion difficult. At the low levels of this 150-ft. quarry, where water becomes a problem, the operators have sunk four, 16 in. dia. holes using a 27-T Bucyrus-Erie drill. The holes, into which 12-in. I.D. casings were put, had to be absolutely straight. Therefore the drill was slowed down to a 12-in. stroke with 52 strokes per minute, giving an average of 2 ft. per day with an occasional high of 5 ft. per 8 hr. Four Pomona deep well pumps, capable of delivering 1000 g.p.m., will be mounted in the 16-in. holes. By using these pumps the company hopes to lower the water table sufficiently to continue quarry operations with little or no water coming into the working level. The operators are also using a Joy drill that drills 6 1/4-in. holes from 45 to 70 ft. per 8 hr., with an average of 50 ft. per 8 hr.



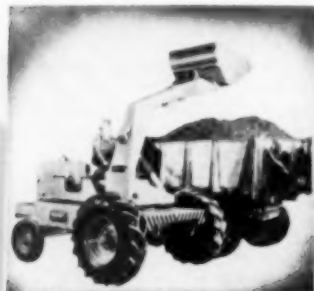
Older section of crushing plant. Improvised shovel in foreground

# New Machinery

**ROCK  
PRODUCTS**

## Hydraulically Controlled Bucket Loader

MANDT MANUFACTURING CO., Columbus, Ohio, is now marketing its 180 deg. bucket loader that is operated by four hydraulic cylinders con-



Loader capable of 180 deg. swing and 8 ft. clearance

trolling hoist and lower, swinging to right or left, and bucket opening or closing. The swinging boom permits loading from a 9-ft. swath and loading to trucks without backing or turning of the machine, the manufacturer claims. Bucket clearance is 8 ft. 2 in. The two-speed hydraulic boom is automatically limited to a 90 degree swing on either side by the length of the rams which operate the hoist deck.

In loading, design of the boom crowds the bucket 16 in. forward into the material being dug as it rises. Weight and leverage of the load is centered on the over-size front wheels for better traction. Road speeds range up to 15 m.p.h. A 1-cu. yd. bucket is available for loading cinders or other light material, and a  $\frac{3}{4}$ -cu. yd. bucket for heavy material such as sand or gravel. A hydraulic goose-neck crane attachment with a lifting capacity of 2000 lb. also is available.

## Two-Segment Unit for Replacement of Kiln Tire

STROH PROCESS STEEL CO., Pittsburgh, Penn., has perfected a diagonally cored, split, metal kiln tire. The manufacturer states that by means of interlocking machined mating surfaces in the rim, the tire can be positioned in the field without tearing out a section or a shell or disturbing the shell's existing alignment. After positioning, the split is welded to make a full, solid ring that will not loosen under heat or load. The tire

reportedly rolls smoothly over the welded joint.

The replacement tires are machined from 35-45 carbon fully annealed A.O.H. steel castings, A.S.T.M. Specifications A 27-46T, Grade N. This metal tests about 170-180 Brinell on the unworked, machined surface of the face, and will work-harden to about 190-200 Brinell. Without excessive sideways flow of the material, a safe loading of about 10,000 lb. per in. of face can be attained. This value varies with the ratio of the diameter of the tire and roller.

## Heavy-Duty, Welded-Steel Conveyor Pulley

AMERICAN PULLEY CO., Philadelphia, Penn., has designed a new line of heavy-duty, welded-steel conveyor pulleys specifically for use in mines and quarries. The new pulleys are made with flexible alloy-steel end discs which is said to be one of the prime features giving them the ability to withstand shaft deflection caused by high belt tensions or heavy loads. In addition it is reported that the light weight of the new pulley makes it easier to install and permits a lighter supporting structure or frame.

## No Melting Point Lubricant

WARREN REFINING & CHEMICAL CO., Cleveland, Ohio, has recently developed a new all-purpose lubricant which has no melting point, it is claimed. According to the manufacturer, the new lubricant has excellent adhesive qualities, excellent pumpability at low temperatures, and does not break down under hard working conditions.

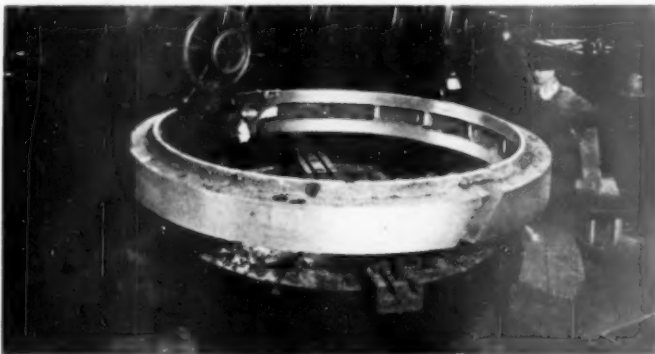
## Tail-Gate Lift for Pick-Up Trucks

ANTHONY CO., Streator, Ill., has recently perfected a hydraulically-controlled tail-gate lift device for pick-up trucks similar to the company's larger



Pick-up truck lift gate of 800 lb. capacity

Lift Gate for 1-ton and over trucks. The manufacturer describes the new device as being operated by twin hydraulic cylinders that are attached directly to the tail gate. Hydraulic power is supplied by a fan-belt driven pump that is equipped with a throw-out clutch; the pump operates only when needed. The gate is raised, lowered or held at any desired position by a single lever control, and it stops automatically at ground level. The unit lifts or lowers a capacity load of 800 lb., and a by-pass valve prevents overloading. The complete attachment weighs 324 lb.



Kiln-tire replacement unit built in two segments



### Introduces One-Cu. Yd. Excavating Machine

MARION POWER SHOVEL CO., Marion, Ohio, has developed a new 1-cu. yd. power shovel that is convertible to dragline, trench hoe, clamshell or crane. It is stated that front-end changeovers can be made quickly in the field without additional machinery, lagging or sprocket changes. A single boom serves for both shovel and back-hoe work, and a single boom with butt-jointed sections is used for dragline, clamshell, crane or pile driver service.

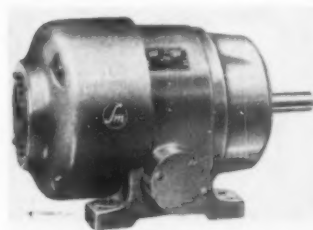
There are only two horizontal shafts on the machinery deck; 22 friction points are equipped with ball or roller bearings; drums and shafts are made of alloy steel; gears are heat-treated and machine cut; independent chain crowd, an air-control system, independent boom hoist with overrunning clutch, and holding brake and safety ratchet are also standard equipment. Slow speed compressor and lubrication fittings are grouped at points of easy access.

### All-Steel Fairleader

AMERICAN HOIST AND DERRICK CO., St. Paul, Minn., recently announced production of a newly designed all-steel fairleader that is made to withstand 100 percent of the strength of the rope. Sizes of the new fairleader are available for  $\frac{3}{8}$ -, 1-, and 1 $\frac{1}{2}$ -in. wire rope. Feature of the new unit's design is that the throat is of sufficient size to allow passage of a wire-rope joint made with clips, such as the Crosby clips. Sheave and head are mounted on anti-friction bearings.

### Fan Cooled Motor

STERLING ELECTRIC MOTORS, INC., Los Angeles, Calif., recently announced that its Kloss-Tite fan-cooled motor is now available with a face-mounted end bracket having N.E.M.A. style C dimensions in ratings from  $\frac{1}{4}$  to 20 hp., inclusive. Obtainable in either footless or standard horizontal design with feet, these face-mounted motors are reported to be ideal for close-coupled pumps, blowers, or other similar applications. Forced draft ventilation of this motor provides adequate cooling by means of a generous size fan.



Fully enclosed motor



Dragline fitted for ease of front-end changeover

These style C face-mounted motors incorporate labyrinth seals on shaft ends, which are said to assure positive protection against entry of liquids into the bearing housings.

### Cemented Carbide Bit

KENAMETAL INC., Latrobe, Penn., is now producing a line of Tri-Point rock drills for drilling granite, sandstone, limestone, etc., with a tip made



Triangular-shaped drill bit

of vacuum-sintered cemented carbide. The triangular design of the thick drill bits is said to give maximum resistance to wear and shock, as well as freedom from packing. Shanks of the drills are heat-treated alloy steel. Diameters of the drills range from  $\frac{3}{8}$  to 1 in., lengths from 7 $\frac{1}{2}$  to 12 in. They are made for use with air or electric powered drills.

### Truck Battery Charger

MOTOR GENERATOR CORP., Troy, Ohio, announces a new "Universal" battery charger for charging any type of industrial truck battery. It is designed to charge 200- to 500-amp.-hr. lead-acid batteries of 12-, 15-, 16- and 18-cell capacity, and/or 150- to 450-amp.-hr. nickel-iron batteries of 20-, 24-, and 30-cell capacity.

### Prospecting Drill

HOSSFELD MANUFACTURING CO., Winona, Minn., recently announced an attachment for its rock drill that adapts it to prospecting for non-metallic ores. The attachment pumps

water through the drill stem and recovers the cuttings so that samples may be taken at any interval. By sampling at frequent intervals, an accurate determination of the various strata being drilled can be determined accurately, it is claimed. The drill is powered by a gas engine and will sink holes from 1 $\frac{1}{4}$  to 2 $\frac{1}{2}$  in. in diameter to a depth of 70 ft. An added advantage claimed for the drill is that it maintains a true hole diameter for the entire depth of the hole.

### Thrust-Bearing Replacement

SAGINAW BEARING CO., Saginaw, Mich., recently placed on the market its Sabeco split washer that is claimed to facilitate replacement of thrust bearings. These replacement split washers are made to order in bronze in any practicable size to fit heavy construction or earth-moving machinery, plant or pump equipment, power house or large electrical installations. The split washer is placed over the shaft and locked with a safety key, thus making on-the-spot repair a fast and economical operation, according to the manufacturer.



Split washer with lock key

## NEW MACHINERY

### Bowl-Type Wheel Scraper

FINDLAY DIVISION, GAR WOOD INDUSTRIES, INC., Findlay, Ohio, is now in production of a completely new 24.5-cu. yd. (heaped), 4-wheel, cable-



Open-bowl, cable-operated, 4-wheel scraper

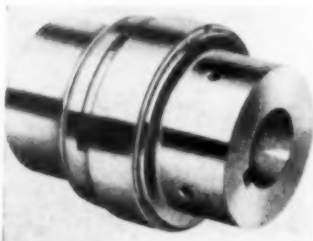
operated, open-bowl scraper. The unit is designed for use with Allis-Chalmers HD-19 tractor. Positive forced ejection is claimed for the unit by virtue of a sliding end gate which moves forward as the load is dumped. The end gate is returned to digging position by heavy springs.

The cutting edge of the scraper is bowed and of three-piece construction, and to assure maximum economy of operation, the end sections and center section are reversible. It is claimed that the bowl and cutting action are so designed that the scraper fills with a full boiling action, assuring full loads with less tractive effort. Three tire size options are offered to accommodate practically all types of digging conditions where scraper flotation is a problem, and for traversing rough terrain a high clearance has been designed into the new model, No. 625.

### Improved Flexible Coupling

LOVEJOY FLEXIBLE COUPLING CO., Chicago, Ill., has improved its type L-R, C and H couplings by forming the inside sleeve in two parts instead of one. According to the manufacturer, the split sleeve makes it easy to put the collar on either half of the coupling. The collar is held in place by a snap ring.

The couplings are designed for use on motor- or engine-driven pumps, compressors, generators, pulverizers and other types of machinery with drives from 50 to 1000 hp. The manufacturer states that these couplings instantly adjust for misalignment,



Flexible coupling with split sleeve

shock, vibration, surge or backlash, and half the cushions are idlers (except on reversing load). Further claims for these units are that there is no wear on the metal jaws, no lubrication is required, and special cushion materials are designed for installations where oils, chemicals, ozone or heat would deteriorate ordinary cushions.

### Redesigns 3/4-cu. yd. Shovel

THE SHovel CO., Lorain, Ohio, has redesigned its 3/4-cu. yd. power shovel, according to a recent release. Turntable design of the Lorain TL-25 is comprised of several major components, each of which is built on its own separate assembly line as an integral unit. Features of the turntable construction include five identical clutches to control all machine operations; one-piece, all-welded bed; hook rollers mounted on drop-forged brackets, and centralized pressure lubrication. Interchangeable front end boom



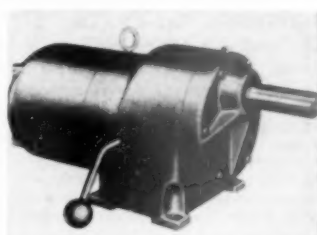
Redesigned 3/4-cu. yd. shovel

equipment is available covering the following equipment: shovel boom with independent cable crowd and one-piece dipper stick, and a crane boom in two sections with flanged, bolted connections and tip extensions. A third drum attachment is available for crane use, and the clamshell is equipped with a Rud-O-Matic tagline.

Mountings include three crawler designs, all of which are two-speed chain-driven crawlers with oil-enclosed propelling mechanism, and equipped with 22-in. wide drop-forged treads. The three designs include standard, wide-gauge and extra long. Rubber-tire carriers are provided in a wide range of types and models. Two-engine moto-cranes, with approximately 33 m.p.h. travel speed, are available in 4x2, 4x4, and 6x4 models.

### Electric Motor and Integral Gearshift Drive

LIMA ELECTRIC MOTOR CO., Lima, Ohio, recently added a new unit to its line of electric motors and gearshift drive combinations. The new unit, designated as Type R3C, features a 4-speed transmission having both primary and secondary gear re-

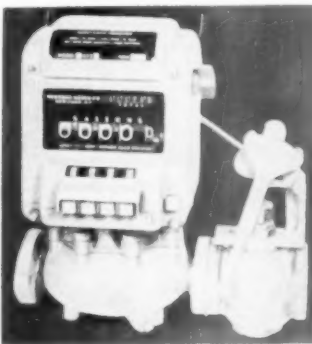


Heavy-duty, selective-speed gearshift drive and motor

ductions constructed integrally with an electric motor. These drives deliver full rated horsepower in each of the four speeds and both constant-torque and constant-horsepower motors are available, which gives increased flexibility of additional speeds. Motors are designed for operation on polyphase, a.c., power supplies of standard frequencies (25, 50 or 60 cycle), and voltages below 600.

### Metered Water Controller

NEPTUNE METER CO., New York, N. Y., recently announced its new Auto-Stop meter that automatically controls the quantity of water used in concrete batches at central-mix plants. This meter, inserted in the line near the mixer, will automatically shut off the flow of water after a predetermined quantity has been delivered into the mixer. In operation, the desired amount of water in gallons is set on numeral wheels on the face of the meter, after which the flow will be automatically closed when the amount has passed the meter. An emergency button is provided for stopping the flow at any time, which does not affect the meter reading or setting. It is stated that the meter is factory calibrated and sealed in a weather and dust proof case. These meters are furnished from stock in 1-, 1 1/2-, and 2-in. sizes. Other sizes are delivered on special request.



Automatic water meter for control mixing operations

## Combined Mechanical and Hydraulic Classifier

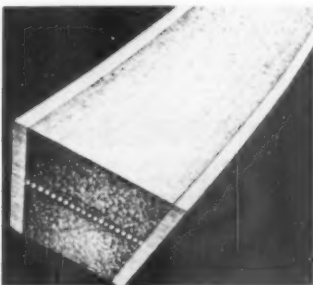
DORR Co., Stamford, Conn., has developed a sensitive material classifier, the Hydrosclassifier, which derives its name from the fact that results are obtained through a combination of upward-flowing water and oscillation. The basic principle involved is the inducing of mechanical mobility of the settled oversize.

The unit consists of two major parts—a shallow, cylindrical oscillating classifying compartment and directly below it, a reciprocating rake dewatering compartment. A vertical motor drive imparts rapid circumferential oscillation about a vertical axis to the cylindrical compartment. Feed enters through a radial trough or launder terminating in an open-bottomed annular feed box at the center. Water under pressure is introduced into the bottom of the classifying compartment through a number of closely-spaced openings in an oscillating constrictor plate.

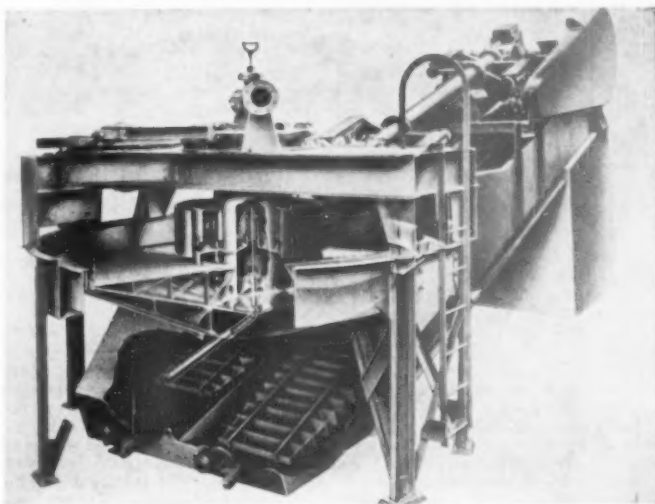
Due to the combined action of the unit, a "teeter bed" is set up, consisting of particles ranging vertically from very coarse granular particles at the bottom to fines at the mesh of separation at the top. These fine particles at the top of the teeter bed are swept outward by the radial flow of water and eventually leave the unit as an overflow product across a peripheral weir. Oversize particles work to the bottom of the teeter bed, flow to the periphery of the classifying compartment, and pass under a stationary side wall and over an oscillating lip into the reciprocating rake compartment. The oversize is picked up by the rakes and advanced up the steeply inclined slope to the point of discharge.

## Stretch-Resistant V-Belt

C. A. SCHIEREN Co., New York, N. Y., announced recently a new concept in V-belt construction that embodies a row of rayon cords bonded between leather plies to minimize stretch. Another outstanding feature claimed for this new belt is that it can



Cross section of V-belt showing rayon cords that minimize stretching



Cutaway view of sensitive material classifier

be spliced as an endless belt right on the sheaves.

The possibility of splicing this belt on the sheaves without having to remove pulleys or bearings is said to be important where outboard bearings interfere with slipping an endless belt onto the units. By the use of special tools, maintaining proper tension on the belt is possible. The belting is supplied in rolls and the splicing is accomplished with a clamp, tension rod, and a belt cement. Mechanical fasteners also may be used to fasten the end of the belt.

## Compact Belt Feeder

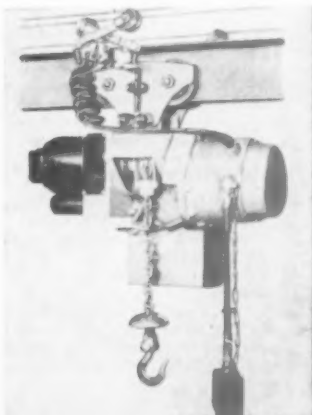
RICHARDSON SCALE Co., Clifton, N. J., has recently placed a totally enclosed belt feeder on the market that is designed for installation in tight spaces. Specifications of the new feeder, according to the manufacturer, are: rated capacity up to 1500 cu. ft. per hr.; lengths from 18 to 60 in. and stream widths of 2, 4 and 6 in.; belt speed ranges up to 200 f.p.m. The unit can be driven by a single-speed motor from either end, from a line shaft, or by a variable speed drive. Manual or special remote control up to 30 starts per min. is optional. It is further stated that despite the compact and fully enclosed design of the unit, it is fully accessible.

## Chain-Type Electric Hoist

YALE & TOWNE MANUFACTURING Co., Philadelphia, Penn., recently made available its chain-type Load King electric hoist that has lifting speeds up to 41 ft. per min., a lower as well as an upper limit stop, and a wide pick-up angle. Available in load

capacities of 500, 1000, and 1500 lb., standard models lift loads through any height up to 400 ft. Principle distinction of the hoist, according to the manufacturer, is that a link chain, over an electrically driven sheave, supports the load, permitting extra long lifting lengths since wound-up chain does not wrap around a drum but collects in a metal container as the hook raises.

The single-strand load chain engages six pockets of the sheave to move and hold loads with a minimum of friction. The hoist hook can exert a lift as much as 30 degrees from the vertical to pick up loads. Control box for the hoist is situated at a level convenient for the operator and the flexible control cable carries switch-energizing current, not load current.



Chain hoist lifts at 41 ft. per min. speed

# Instrumentation

## Practical Aspects of Instrumentation

Warner Co. considered all angles including human factors before installing a central instrument and control board on lime kiln

IN RECONDITIONING the No. 2 rotary kiln at the Bellefonte plant of the Warner Co. for higher output and greater efficiency, it was determined to give the kiln a central instrument and control panel. Heretofore at various points, we had developed various instrumentation on a more or less opportunist basis. Now we had the opportunity to crystallize our experience and views on one board.

Many control boards were studied at other plants, both cement and lime. It was felt that many had non-essential information. Others lacked information which we regarded as important. It was desired to have an irreducible minimum of that which was essential for our purposes. The reasons for inclusion or omission will be given herein. In some cases, information was essential to our particular layout and would not be required in other installations.

The kiln has a shell 9 ft. x 173 ft. and is provided with lightweight coolers of the planetary, or Unax type, of unusually large volume and excellent heat exchange capacity. These reduce the temperature of the lime to 250 deg. F. and provide air at 600 deg. F. Plant men prefer the cool lime, and efficient heat regeneration is an effective contribution to fuel efficiency.

Fig. 1 shows the control board and identifies the equipment. Fig. 2 is a side view of the board. Speed control is by slip ring motor. The controller is at present in another location; however, a new one is on order which will be placed adjacent. It will include new modern resistors with easily adjustable taps for proper uniform steps in speed control.

Details of the switchboard and reasons therefore are given herewith.

### Left-hand Panel

Indicating Draft Gauge—Hays Corp.

1. Blank for possible future need.
2. Main draft fan suction. Reads 0-5 in. in tenths.
3. Kiln feed end. Reads 0-5 in. in tenths.

Note: No. 2 and No. 3 simply tell if the draft fan and dust collector are functioning properly. No. 3 will rise with any kiln obstruction.

4. The hood or, more properly, the

By IRVING WARNER\*

end shield. Reads 0-1 in. in 1/100ths. Normal reading about .25 in. With the Unax-type coolers, this point is important. The coolers have resistance to the passage of the air so act as an orifice. The reading on the draft gauge is proportional to the square of the amount of air passing through. It is of value currently and also for long range comparison.

5. Differential between No. 3 and No. 4. Reads 0-2 in. in steps of 0.2 in. This shows directly the loss of head through the kiln proper. It is of value in showing increased resistance due to scale ring build-up. Although this can be read as the difference between No. 3 and No. 4, it is felt that it is better to have a direct reading of the pressure drop through the kiln.

Speed Indicator and Recorder—The Brown Instrument Co.

Calibrated in revolutions per hr. 0-100 r.p.h.

Motor Control Push Buttons

1. Main draft fan.
2. Coal mill (bowl mill).
3. Two conveyors.
4. Lime screen.
5. Pan conveyor, coolers to screen.

### Center Panel

Electric Clock—Edwards Co.

Ammeters

1. Fan.
2. Kiln. Shows if kiln drags hard for any reason.
3. Coal mill. Has high and low alarm to warn if anything is wrong with the mill or if the coal feed fails.

Four-Point Potentiometer—Brown Instrument Co.

Calibrated 0-2400 deg. F.

1. Fan temperature. For protection of fan and dry collector.
2. Gases exiting from kiln. Shows

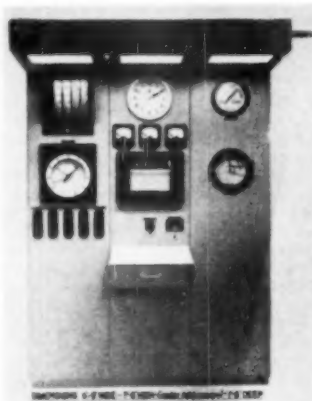


Fig. 1, left: Front view of instrument and control panel, No. 2 rotary kiln. Top to bottom, left panel contains: Draft indicator—spare, fan, kiln, hood, kiln differential; Kiln speed r.p.h. indicator and recorder; Motor controls—fan, cool, mill, A and B conveyors, screen and pan conveyor. Center panel contains: Clock; Ammeters—fan, kiln, coal mill; Four-point potentiometer recorder—fan temperature, feed end temperature, shell temperature and hood temperature; Dampor control; Kiln revolution counter. Right panel: Clean air purge pipe keeps cabinet under slight pressure to prevent dust in leakage; Dampor position indicator, Selsyn operated; Hood draft recorder. Note that all recording instruments are at eye level. Fig. 2, right: Side view of control board. Depth is 18 in. Back is covered with flanged panels attached by wing nuts and are easily removed for quick access. The space is purged with filtered air by a small centrifugal fan. The air flows out through the instruments, keeping them clear of dust.

\*Vice-president, Warner Co., Philadelphia, Penn.

any change of efficiency or conditions.

3. In the lining, short exposure, 58 ft. from discharge. This point is about one hour from the discharge end. It was hoped that this would give the operators advance notice of the condition of the kiln. It is to be noted that this location is at the point where the temperature curve of gases and charge are steepest in the length of the kiln. So far our expectations have not been fully justified. Since there has been considerable trouble in maintaining the collectors and rings, we have not yet had sufficient data to determine this point.

At a point over the dam as shown in Fig. 3. This is found to be very valuable. Unfortunately, it is of no value to the operator in foretelling the condition of the kiln, but it is of value to the kiln superintendent in seeing that the kiln has been operating properly as shown by the record. Also it helps to train the eye of a new man by showing him the result of his observation of the kiln. It is surprising how constant an operator can keep this temperature. Yet, there is a marked change in the reading if the calculation is not correct.

This couple is carried in a 1 in. stainless steel pipe mounted on the end shield. The actual couple should project 2 in. or 3 in. beyond the pipe for quick response. Its reading is purely arbitrary and empirical. It averages out such factors as the temperature of the secondary air and the radiation, plus and minus, from the lime and refractories.

Its location is rather critical. Repairs to the kiln usually result in the couple not going back into

exactly the same location. Hence the reading for correct calcination will change. Competent authority of the plant must then determine the new reading for correct calcination. The couple itself must not change during service due to any cause such as bending of pipe, injury from scale coming out, etc.

Remote Damper Control (in center).  
Electric Revolution Counter (at right).  
Desk, with drawer, for the daily log.

### Right Panel

### Damper Position Indicator

Home-made from an old voltmeter case. Note that the arrow shows the damper itself in the flue. The pictorial effect helps the observer. It is calibrated in degrees for the log.

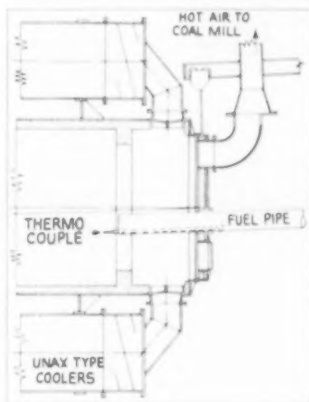


Fig. 3: Section of discharge end of kiln showing the ports to the Unax-type coolers through which the heated air enters the kiln with hot air take-off for coal mill. Dam and the thermocouple also are shown at this point



Fig. 4: Reproduction of log sheet used

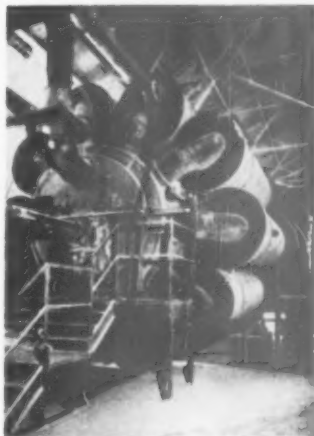


Fig. 5: Discharge end of kiln. End shield is 6 in. thick and is lined with 4½ in. of firebrick and 1½ in. of Superox. The coolers are insulated with 1½ in. of Kaylo and are sheathed with steel.

**Hood Draft Recorder**—Republic Flow Meter Co., 0-5 in.

This records the draft indicator

This records the draft indicator No. 4 on the hood. We had this instrument in surplus equipment and installed it in view of our feeling of the critical nature of this data for our particular layout.

The board itself is an assembly of standard parts furnished by the Falstrom Co. On account of limited space, we could not provide enclosed working space back of the board. Accordingly, light flanged panels are attached with wing nuts. These give ready access.

The 18-in. space back of the board is supplied with filtered air by a small centrifugal fan. This keeps the instruments purged with clean air, although the faces are subject to dust. This arrangement has proved satisfactory. Air filters were supplied by Dollinger Corp.

## Conclusions

Our experience on instruments leads us to certain conclusions, as follows:

1. Leave space for future instrumentation. Many good boards have been butchered by the desire of adding another instrument for which there was no space. In our own case, the addition of the hood draft recorder was an afterthought, but the space was available.
2. The hood over the board is desirable in that it affords protection against falling dust, and also provides good lighting.
3. Recorders should be at the level of the eye, for easy study and servicing.

4. It is highly desirable that big rotating pointers be used, and the center or pivot point be in view. Uncon-

(Continued on page 105)



# Sand Recovery



Loader is reclaiming masons sand. Rotary scrubber can be seen upper right, with the sand machine in background

Amico Sand and Gravel Co., Morrisville, Penn., utilizes overhead rotary scrubber, sand washer; all sand recovery equipment rests on ground

## Gravity Operation in Sand Production

AMICO SAND AND GRAVEL CO., Morrisville, Penn., has been operating in the area for many years. Morrisville is just across the Delaware river from Trenton, N. J. During July of last year the company placed a new plant in operation approximately two miles from the older one. The new plant will serve the immediate district and reach into the Philadelphia area as well. The plant, which has a capacity of 150 t.p.h., ships all of its products by truck; however, a rail shipping point is available at the older plant. C. M. Ambler is president of the firm and Jacob Bauer is vice-president and treasurer. At the time of inspection, Mr. Bauer was actively supervising initial operations.

The company has at the new site some 60 acres of gravel-bearing ground. The gravel is 45 to 50 ft. deep with the water table standing at about 20 ft. from the surface. Overburden is very slight and is moved aside by a tractor and dozer. Gravel consists mainly of small sizes although occasionally plus 6-in. pieces are encountered. The company has three trucks hauling from the pit to plant and these are loaded by a Northwest dragline using a 1-cu. yd. Page bucket. The haul is relatively short and the trucks go up a dirt ramp and rear-dump to a 6-in. rail grizzly ahead of an 18- x 36-in. Cedarapids primary jaw crusher. The grizzly slopes about 20 degrees from the horizontal and the few pieces of oversize that are present

are pushed to the crusher by the grizzly attendant.

The minus 6-in. material falls into a 25-ton hopper from which it is taken by a 6-ft. belt feeder to a second grizzly with 2½-in. openings. The minus 2½-in. material falls directly on to a 30-in. conveyor belt and the oversize slides into the primary crusher and then drops onto the belt.

All the products from the primary section fall to the 30-in. inclined belt

and are delivered to a 72-in. x 10-ft. Tel-smith rotary scrubber where water is added and the material is given a thorough scrubbing. The scrubber discharges direct to a flat, double-deck wet, Cedarapids scalping screen with oversize falling to a 36-in. Tel-smith Gyrasphere crusher.

The scalper screen has a top deck of 1½-in. wire and a lower deck of ¼-in. wire. Throughs from the lower deck join a 12-ft. 3-in. dia., Dorco sand washer which prepares the concrete sand. The operators expressed the opinion that sand recovery devices should be equipped either with variable speed motors, or some other device to quickly change the speed of the machine. Thus, turbulence within the unit could be increased or decreased and some size control could be accomplished. Overflow from the

(Continued on page 106)



Jacob Bauer, vice-president and treasurer

### RIGHT:

(1) Dragline with 1-cu. yd. bucket loads pit material to truck for delivery to primary crusher. (2) General view of plant showing final screening and washing section which is located over the seven truck-loading bins. Sand machines and scrubber are to extreme right in background. (3) Conveying system consisting of 30-in. belt, foreground, 24-in. gravel belt and 18-in. concrete sand belt, side by side, in background. Note sand drag under head end of first conveyor. (4) Truck dumps to grizzly ahead of 18- x 36-in. primary crusher. (5) Secondary crusher is a 36-in. unit. (6) Looking down on 12-ft. 3-in. dia. sand machine which prepares the concrete sand



## PHYSICAL PROPERTIES OF CALCINED GYPSUM

Theoretical work on the system  $\text{CaSO}_4\text{-H}_2\text{O}$  involving specific heat measurements, heat of hydration, thermodynamic data, dissociation-equilibrium measurements and stability diagrams reviewed in terms of practical calcining

By W. C. RIDDELL\*

**T**ECHNICAL PAPER No. 625, U. S. Bureau of Mines, published by Kelley, Southard and Anderson in 1941 is a critical study of gypsum and its dehydration products. This theoretical study covered a period of about two years and the following subjects are discussed in detail:

1. The various forms of calcium sulfate and its hydrates and their preparation.
2. Heats of hydration.
3. Specific heats.
4. Dissociation-equilibrium measurements.
5. Correlation of thermodynamic properties.
6. Stability diagrams of system  $\text{CaSO}_4\text{-H}_2\text{O}$ .

This work is the most complete and careful study of the system  $\text{CaSO}_4\text{-H}_2\text{O}$  since J. H. van't Hoff published his studies of gypsum in 1901.

This article is an attempt to review, if possible, in more readily usable form the theoretical data in Technical Paper 625. Additional data also are presented and the authors of Technical Paper 625 should not be held accountable for any of the statements made here. Southard discusses and reviews the published data on the various forms of calcium sulfate and hydrates and concludes:

All the varieties of the dihydrate  $\text{CaSO}_4\cdot 2\text{H}_2\text{O}$  have the same energy content and probably the same crystalline form: monoclinic prismatic, with 4 or 8 molecules in the unit cell. From x-ray diffraction studies the crystal lattice is considered made up of layers of calcium atoms and sulfate groups separated by sheets of water molecules. It should be noted that the water molecules occupy a special position in the crystal lattice and that it should be impossible to remove any of the combined water without destroying the lattice, and therefore any lower hydrate of  $\text{CaSO}_4\cdot 2\text{H}_2\text{O}$  should have a different structure than that of the dihydrate; in fact, all the dehydration products of  $\text{CaSO}_4\cdot 2\text{H}_2\text{O}$  give x-ray powder photographs dis-

tinctly different from that of gypsum. This important position of the water molecules in the gypsum lattice, and the difference in structure of its dissociation products, could well account for the period of induction which can be readily observed when pure gypsum is dehydrated.

### Dehydration Curves

In Fig. 1, a dehydration curve of Plaster City rock gypsum clearly shows the induction period. Similar dehydration curves have been plotted for gypsum samples from many localities and the effect of inorganic and organic compounds on the temperature and rate of dehydration has been studied. Fig. 2 shows typical examples of dehydration curves for gypsum in the presence of 0.1 to 0.2 percent of several salts. Similar curves have been plotted for many of the soluble sulfates, chlorides, nitrates, hydroxides, phosphates and a number of solu-

ble organic compounds as well as dehydration curves in partial vacuum. A trace of most soluble salts affects the decomposition temperature of gypsum, and this is one of the methods of determining their presence.

The difference in structure between the dihydrate and hydrates of lower water content would also seem evident from the fact that a few lb. per ton of ground gypsum or pre-set plaster  $\text{CaSO}_4\cdot 2\text{H}_2\text{O}$  added to calcined gypsum, which is essentially  $\text{CaSO}_4\cdot \frac{1}{2}\text{H}_2\text{O}$ , will materially accelerate the setting time. If both of these materials had the same crystalline structure, no effect on setting time should be observed. Davis discusses this in his article on "Production and Setting of Plaster of Paris."

### Forms of Hemihydrate

There are two forms of the hemihydrate, alpha  $\text{CaSO}_4\cdot \frac{1}{2}\text{H}_2\text{O}$  and beta  $\text{CaSO}_4\cdot \frac{1}{2}\text{H}_2\text{O}$ . It is the consensus of opinion that the hemihydrate,  $\text{CaSO}_4\cdot \frac{1}{2}\text{H}_2\text{O}$ ,

\*W. A. Davis, *Jour. Soc. Chem. Ind.*, Vol. 26 (1907).

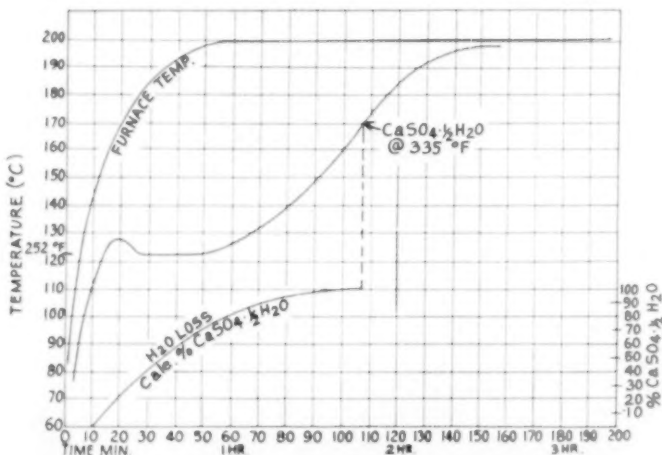


Fig. 1: Dehydration curve of Plaster City Rock Gypsum

\*Chemical Engineer, Kaiser Gypsum Co., Oakland, Calif.

$\frac{1}{2}\text{H}_2\text{O}$ , is the only lower hydrate of calcium sulfate, the identity of which has been established with any degree of certainty. Perhaps the most important work is that of Gallitelli.<sup>2</sup> He describes the hemihydrate as a deformed monoclinic structure with 12 molecules of  $\text{CaSO}_4 \cdot \frac{1}{2}\text{H}_2\text{O}$  in a unit cell, and says the lattice structure possesses great stability because the calcium atoms and sulfate tetrahedrons are so arranged that there are strong bonds between the calcium atoms in one layer and the sulfate groups of the adjacent ones, and that there are channels within the lattice in which the water molecules are situated. The forces holding the water molecules are less than the forces between the other groups and this permits at least part of the water to be removed without disrupting the crystalline structure. This effect is just the opposite of that which takes place in the case of removal of the water molecules in the dihydrate  $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$ .

The recorded data agree well with this postulation; dissociation of  $\text{CaSO}_4 \cdot \frac{1}{2}\text{H}_2\text{O}$  to form  $\text{CaSO}_4 + \text{H}_2\text{O}$  proceeds with no induction period until the major portion of the water is removed; x-ray investigations all agree that no noticeable change in structure can be detected.

Alpha  $\text{CaSO}_4 \cdot \frac{1}{2}\text{H}_2\text{O}$  can be prepared by dehydration of gypsum in water above a temperature of 97 deg. C., by dissociation in a salt solution below this temperature, and by dissociation in an atmosphere of steam.

Beta  $\text{CaSO}_4 \cdot \frac{1}{2}\text{H}_2\text{O}$  can be prepared by dissociation of gypsum in a vacuum at 100 deg. C.

It should be noted that in the dehydration of gypsum to produce  $\text{CaSO}_4 \cdot \frac{1}{2}\text{H}_2\text{O}$  by the "kettle process," in which steam is always present, alpha  $\text{CaSO}_4 \cdot \frac{1}{2}\text{H}_2\text{O}$  is always produced in greater or lesser amounts, depending on kettle construction, time of heating and temperatures. Exhaust fan from the kettle top, rapid heating of the kettle charge and rate of loading the kettle all affect the amount of alpha hemihydrate formed.

Both the alpha and beta form of hemihydrate have the same crystalline form; however, the beta form has a definitely higher energy content and a higher solubility. Southard determined the heat of hydration of samples of calcined gypsum made by the "kettle process" in a standard type 10 ft. dia. x 12 ft. deep Ehram kettle. His results indicate that, in this particular kettle, the calcined hemihydrate produced for use as hardwall plaster had the composition of 75 percent alpha  $\text{CaSO}_4 \cdot \frac{1}{2}\text{H}_2\text{O}$  plus 25 percent beta  $\text{CaSO}_4 \cdot \frac{1}{2}\text{H}_2\text{O}$ , and that the hemihydrate made by the addition in the kettle of 0.1 percent of a salt, such as  $\text{CaCl}_2$ , produced for the manu-

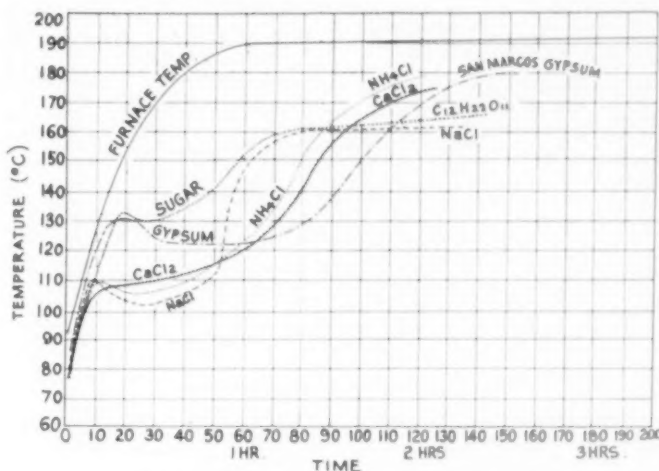


Fig. 2: Dehydration curves of gypsum plus 0.1 percent salts

facture of casting plasters, was practically all in the form of alpha  $\text{CaSO}_4 \cdot \frac{1}{2}\text{H}_2\text{O}$ . This is probably the first authentic evidence we have that alpha hemihydrate is produced by the "kettle process" and that this product has the same physical structure as that of alpha hemihydrate produced by other process apparatus. Fig. 2 is typical of many curves plotted for the addition of various other salts in varying molar proportions which indicate a marked change in the dehydration of gypsum to hemihydrate.

#### Soluble Anhydrites

Tests on pure beta hemihydrate show an extremely high water-carrying capacity and normal consistency, comparable with that of lime putties; dehydration in the presence of certain salts will produce a hemihydrate of relatively low normal consistency. There are two forms of soluble anhydrite,  $\text{CaSO}_4$ , corresponding to the alpha and beta forms of  $\text{CaSO}_4 \cdot \frac{1}{2}\text{H}_2\text{O}$ . They have different heats of hydration and different solubility.

Alpha soluble anhydrite can be prepared by dehydration of alpha hemihydrate in a vacuum at 100 deg. C., or at 110 deg. C in air saturated with water vapor at room temperature.

Beta soluble anhydrite can be prepared by dehydration of beta hemihydrate at 100 deg. C. or by heating gypsum in an atmosphere of low water vapor content at 140 to not over 200 deg. C.

Both forms of soluble anhydrite contain some residual water, alpha  $\pm .05$  percent and the beta from 0.6 to 0.9 percent. It is virtually impossible to dehydrate completely the beta form without affecting its physical properties. Both forms are excellent drying reagents, absorbing water to form hemihydrate, and are largely used in

industry as such. They can be regenerated by heating to below 200 deg. C. or for short periods at as high as 250 deg. C.

It should be noted that both the alpha and beta hemihydrates absorb as much as 1 percent more water than is required for the formula  $\text{CaSO}_4 \cdot \frac{1}{2}\text{H}_2\text{O}$ . The amount of water held is dependent on temperature and humidity conditions and can be removed below 66 deg. C. in normal air. Plaster on storage tends to become "dead," that is, lean working, particularly when stored under conditions of high humidity. Alpha hemihydrate is the more stable form and heat of hydration measurements indicate that beta hemihydrate gradually changes to alpha hemihydrate when aged under humid conditions. This would account for the change taking place in the workability of plaster on storage.

#### Insoluble Anhydrite

There is only one form of insoluble or natural anhydrite,  $\text{CaSO}_4$ . This can be prepared by heating gypsum or soluble anhydrites at 900 deg. C. for one hour. It can also be prepared by crystallization from salt solutions at about 100 deg. C.

Insoluble anhydrite does not take up water at any appreciable rate. It has the lowest solubility in water of any of the calcium sulfates. It is a simple orthorhombic lattice; the unit cell contains 4 molecules and the lattice has the maximum packing, highest density and most stable arrangement of any of the calcium sulfates. Natural and artificial anhydrites have the same optical and thermal properties.

The heats of hydration of calcium sulfates are summarized in Table I.

It is evident from these data that there is no difference in the energy

<sup>2</sup>Gallitelli, *Periodico Mineral*, Vol. 4 (1933)  
<sup>3</sup>Gallitelli, *Neues Jahrb. Mineral. Geol., Referate*, 1 (1933)

## GYPSUM

Form	Reaction	Calories per gram formula mass	B.t.u. per lb. of $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$
$\text{CaSO}_4$ (anhydrite) + $2\text{H}_2\text{O} = \text{CaSO}_4 \cdot 2\text{H}_2\text{O}$		-4030	42.1
$\text{CaSO}_4$ ( $\beta$ -soluble anhydrite) + $2\text{H}_2\text{O} = \text{CaSO}_4 \cdot 2\text{H}_2\text{O}$		-7210	75.4
$\text{CaSO}_4$ ( $\beta$ -soluble anhydrite) + $2\text{H}_2\text{O} = \text{CaSO}_4 \cdot 2\text{H}_2\text{O}$		-6150	64.4
$\text{CaSO}_4 \cdot \frac{1}{2}\text{H}_2\text{O}$ ( $\alpha$ -hemihydrate) + $1\frac{1}{2}\text{H}_2\text{O} = \text{CaSO}_4 \cdot 2\text{H}_2\text{O}$		-4100	42.9
$\text{CaSO}_4 \cdot \frac{1}{2}\text{H}_2\text{O}$ ( $\beta$ -hemihydrate) + $1\frac{1}{2}\text{H}_2\text{O} = \text{CaSO}_4 \cdot 2\text{H}_2\text{O}$		-4600	48.1
Commercial hemihydrate $\text{Ca} \frac{1}{2}$ alpha $\text{CaSO}_4 \cdot \frac{1}{2}\text{H}_2\text{O}$		-4230	44.3
Average commercial hemihydrate $\frac{1}{4}$ beta $\text{CaSO}_4 \cdot \frac{1}{2}\text{H}_2\text{O}$ estimated as		-4300	45.0
Heat of solution in calories per gram formula mass of $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$ in 53.43 kg. of 2.03 normal HCl at 25 deg. C. =			
Gerlach selenite			5700
Alaska rock gypsum			5698
Set plaster (from San Marcos rock gypsum)			5682
hemihydrate containing 20.92 percent $\text{H}_2\text{O}$			5706
Precipitated $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$			5710

Table 1. Heats of hydration of calcium sulfates

content of various samples of  $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$  and that if any differences are observed they must be differences in mechanical condition and not in crystalline form.

Table I shows the heats of hydration of the definitely known calcium sulfates. Calories per gram formula mass are calculated to B.t.u. per lb. by dividing by 172 and multiplying by 1.8. It is estimated that in the production of commercial calcined gypsum, essentially  $\text{CaSO}_4 \cdot \frac{1}{2}\text{H}_2\text{O}$ , the average kettle with a calcining period of 2 to 2½ hours, the average heat of hydration would be 4300 cal. per 4300

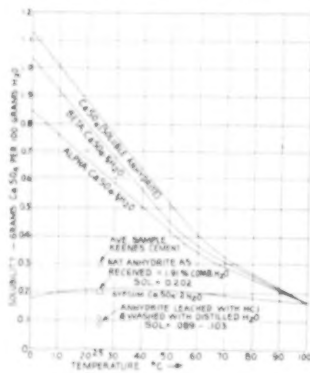
g.f.m.;  $\frac{4300}{172} \times 1.8 = 45.0$  B.t.u. per lb.

or 90,000 B.t.u. per ton of  $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$ . The average heat required per ton of gypsum feed, which also takes into consideration the heat carried off in the liberated water vapor and heat in the calcined product discharged at 340 deg. F., is calculated by the above process as 550,000 B.t.u. per ton of  $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$ . Calculating an average loss of 15 percent combined water, this would give 550,000 - 85 = 647,000 B.t.u. per ton of calcined  $\text{CaSO}_4 \cdot \frac{1}{2}\text{H}_2\text{O}$  produced.

Production figures for a 10-ft. dia. x 12-ft. deep Ehrsam kettle show that it requires an average of 8 gal. of oil (150,000 B.t.u./gal.) or 1,200,000 B.t.u. per ton of stucco produced. An approximate calculation gives 647,000 + 1,200,000 = 54 percent as the practical furnace efficiency under existing operating conditions. It does not take into account the efficiency which might be attained if the available heat in the water vapor and the stack gases were utilized. Similar calculations on natural gas-fired kettles of the same size and construction show an average of 1025 cu. ft. of gas used (1140 B.t.u. per cu. ft. gross = 1,170,000 B.t.u.) per ton of calcined gypsum produced, and 647,000 = 1,170,000 = 55.3 percent as the practical furnace efficiency.

Kelley computes the mean specific heat for the interval 84 deg. to 350

deg. F. as 0.220 B.t.u. per lb. for calcined gypsum (plaster) allowing for the relative proportions of alpha and beta  $\text{CaSO}_4 \cdot \frac{1}{2}\text{H}_2\text{O}$  and soluble beta  $\text{CaSO}_4$  formed in the kettle. This average figure of 0.220 B.t.u. per lb. of kettle-calcined gypsum can be used to advantage in calculating the heat

Fig. 3. Solubility curves of gypsum and  $\text{CaSO}_4$  hydrates

loss in the calcined product. This figure times the weight of the calcined charge times the difference in temperature of the gypsum feed and the discharge test equals heat loss in B.t.u.

The dissociation-equilibrium measurements made by Southard show that different samples of gypsum have the same lattice energy, that there is only one crystalline form of gypsum, and

that alpha  $\text{CaSO}_4 \cdot \frac{1}{2}\text{H}_2\text{O}$  can be produced in liquid water at approximately 100 deg. C. and below in a water solution of lowered activity. In this case, Southard used alcohol, but a salt could be added to lower the activity of the water. Southard's data give  $100 \pm 1$  deg. C. as the temperature at which  $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$ , alpha  $\text{CaSO}_4 \cdot \frac{1}{2}\text{H}_2\text{O}$  and water are in equilibrium. Partridge and White give the equilibrium temperature at between 98 and 100 deg. C.; Posnjak gives it as  $97.5 \pm 1$  deg. C. at a temperature of 97 deg. C., as calculated from the free-energy equation.

We have made solubility determinations, over the range of 0 deg. to 100 deg. C. on  $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$ , alpha  $\text{CaSO}_4 \cdot \frac{1}{2}\text{H}_2\text{O}$ , beta  $\text{CaSO}_4 \cdot \frac{1}{2}\text{H}_2\text{O}$  soluble anhydrite and insoluble anhydrite. Fig. 3 gives this data, and it should be noted that the solubility curves of the lower hydrates intersect the solubility curve of  $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$  between the temperature of 97 to 100 deg. C., which corresponds to the equilibrium temperature. The solubility data are given in Table III.

Solubility determinations have been made on samples of natural anhydrite from various deposits. All of these samples contained combined water varying from 1.5 to over 2 percent. Solubility determinations on a sample of natural anhydrite analyzing 1.91 percent combined  $\text{H}_2\text{O}$  gave .202 gram  $\text{CaSO}_4$  per 100 cc. solution at 25 deg. C., which is equivalent to the solubility of  $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$  at this temperature.

Part of this sample was leached with HCl, washed with distilled water and dried at 66 deg. C. This sample was free from combined water and the solubility at 25 deg. C. was:

In 15 min. = .0460 gm.  $\text{CaSO}_4$  for 100 cc. sol.  
In 1 hr. = .0950 gm.  $\text{CaSO}_4$  for 100 cc. sol.  
In 24 hr. = .1038 gm.  $\text{CaSO}_4$  for 100 cc. sol.  
The average solubility of several samples of Keenes cement, as received, was .2932 grams  $\text{CaSO}_4$  per 100 c.c. solution at 25 deg. C. The solubility of  $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$  at 25 deg. C. is .201 grams. Keenes cement with a lower solubility than .201 at 25 deg. C. will not set.

Samples of gypsum, analyzing 97 percent  $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$ , were ground and calcined in a Raymond Imp mill at 310 deg. F. to a fineness of 99 percent minus 200-mesh and combined  $\text{H}_2\text{O}$  content of 5.95 percent. Solubility determination at 20 deg. C. on these samples gave a solubility of .808

	Calculated in calories per gram formula mass	Calculated B.t.u. per lb.
$\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$	$C_p = 21.84 + .076 T$	@ 80 deg. F. = 0.259
$\alpha\text{CaSO}_4 \cdot \frac{1}{2}\text{H}_2\text{O}$	$C_p = 16.95 + .039 T$	@ 340 deg. F. = 0.2362
$\beta\text{CaSO}_4 \cdot \frac{1}{2}\text{H}_2\text{O}$	$C_p = 11.84 + .061 T$	@ 340 deg. F. = 0.266
$\text{CaSO}_4$ (all varieties)	$C_p = 14.10 + .033 T$	@ 340 deg. F. = 0.212
$\text{H}_2\text{O}$ (gas)	$C_p = 7.45 + .002 T$	
$\text{H}_2\text{O}$ (liquid)	$C_p = 18.02$	

Table II. Specific heats of the calcium sulfates (after Kelley)



## GYPSUM

grams of  $\text{CaSO}_4$  per 100 c.c. solution. From the solubility chart, which gives the solubility of beta  $\text{CaSO}_4 \cdot \frac{1}{2}\text{H}_2\text{O}$  at 20 deg. C. as .802, it would appear that Imp mill material may be considered largely beta  $\text{CaSO}_4 \cdot \frac{1}{2}\text{H}_2\text{O}$ . This type of calcining apparatus should produce a high percentage of beta hemihydrate, as the mill temperatures are high and water vapor concentrations low and very rapid dehydration is accomplished. As shown by Kelley and Southard these conditions favor the formation of beta hemihydrate.

In the correlation of the thermodynamic properties of gypsum and its dehydration products, Kelley and Southard give the free energy equations for the formation of alpha  $\text{CaSO}_4 \cdot \frac{1}{2}\text{H}_2\text{O}$ , beta  $\text{CaSO}_4 \cdot \frac{1}{2}\text{H}_2\text{O}$  and the corresponding alpha and beta  $\text{CaSO}_4$  (soluble anhydrites) and  $\text{CaSO}_4$  (insoluble). Little would be gained by quoting here the equations and calculations of Kelley and Southard, as the original text can be consulted. However, certain data derived from these calculations are of practical interest:

"It appears that a rapid disruptive reaction is necessary in forming beta  $\text{CaSO}_4 \cdot \frac{1}{2}\text{H}_2\text{O}$ ." The temperature at which  $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$ , alpha  $\text{CaSO}_4 \cdot \frac{1}{2}\text{H}_2\text{O}$  and liquid water are in equilibrium is 97 deg. C.; this equilibrium temperature can be depressed by the presence of soluble salts or other substances that lower the activity of the water and alpha  $\text{CaSO}_4 \cdot \frac{1}{2}\text{H}_2\text{O}$  can be formed at as low a temperature as 25 deg. C. if the activity of  $\text{H}_2\text{O}$  is 0.38.

The reaction  $\text{CaSO}_4 \cdot 2\text{H}_2\text{O} = \text{beta soluble CaSO}_4 + 2\text{H}_2\text{O}$  occurs either directly or indirectly to some extent in the kettle manufacture of plaster or in a very rapid calcining of  $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$ .

"Either variety of soluble  $\text{CaSO}_4$  (alpha or beta) at ordinary temperatures is less stable than either variety of  $\text{CaSO}_4 \cdot \frac{1}{2}\text{H}_2\text{O}$ ." At all temperatures below 191 deg. C., alpha  $\text{CaSO}_4 \cdot \frac{1}{2}\text{H}_2\text{O}$  is more stable than beta  $\text{CaSO}_4 \cdot \frac{1}{2}\text{H}_2\text{O}$  and therefore at plaster making temperatures alpha  $\text{CaSO}_4 \cdot \frac{1}{2}\text{H}_2\text{O}$  should be obtained if the conditions are favorable for recrystallization. In the presence of liquid water pure alpha hemihydrate always forms and a slow dissociation in the presence of steam forms this product.

A summary of the more important heats of hydration of the calcium sulfates is shown in Table IV.

Hydrogen ion determinations on various samples of gypsum and plaster are shown in Table V. Determinations were made with saturated calomel-quinhydrone and antimony electrode assemblies at 20 deg. C. The results are shown therein.

The apparent acidity of calcined gypsum may account for certain reactions in the control of the setting time

(Continued on page 102)

Hulett and Allen data for solubility of $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$		Author's data for solubility of alpha $\text{CaSO}_4 \cdot \frac{1}{2}\text{H}_2\text{O}$	
Temp. deg. C.	Grams $\text{CaSO}_4$ per 100 c.c. sol.	Temp. deg. C.	Grams $\text{CaSO}_4$ per 100 c.c. sol.
0	.1759	3	.825
10	.1928	11	.748-.750
30	.2090	21	.662
40	.2097	23	.658
50	.2038	24	.648
60	.1996	31	.598
80	.1802	50	.426-.424
100	.1619	75	.270-.271
		92	.194-.192

Author's data for solubility of beta $\text{CaSO}_4 \cdot \frac{1}{2}\text{H}_2\text{O}$		Author's data for solubility of $\text{CaSO}_4$ (soluble anhydrite)	
Temp. deg. C.	Grams $\text{CaSO}_4$ per 100 c.c. sol.	Temp. deg. C.	Grams $\text{CaSO}_4$ per 100 c.c. sol.
0	1.034	2	1.15
3	1.006	3	1.13
4	.994	14	.960-.962
25	.744-.743	23	.854-.850
40	.578-.580	34	.710-.708
50	.460-.462	53	.482
65	.350	62	.398
		64	.386
75	.286-.284	77	.284
86	.228	78	.278
96	.180-.181	94	.188

Table III. Comparison of data for solubilities of calcium sulfate hydrates

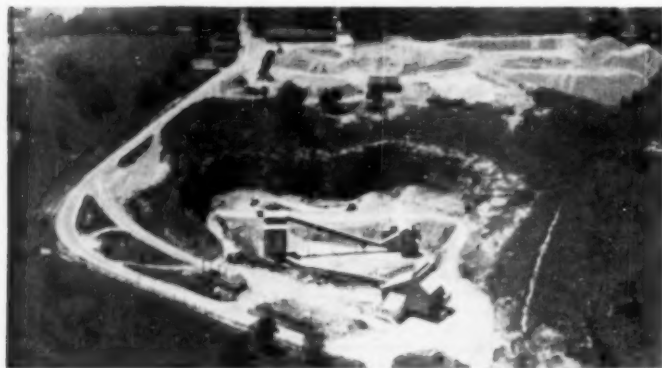
Reaction	Heat of reaction $\Delta H$ g.f.m.	Calculated B.t.u./lb.
$\text{CaSO}_4 \cdot 2\text{H}_2\text{O} = \text{CaSO}_4$ insoluble anhydrite + $2\text{H}_2\text{O}$ liquid	4030	42.2
$\text{CaSO}_4 \cdot 2\text{H}_2\text{O} = \text{CaSO}_4 \cdot \frac{1}{2}\text{H}_2\text{O}$ alpha + $\frac{3}{2}\text{H}_2\text{O}$	4100	42.9
$\text{CaSO}_4 \cdot 2\text{H}_2\text{O} = \text{CaSO}_4 \cdot \frac{1}{2}\text{H}_2\text{O}$ beta + $\frac{3}{2}\text{H}_2\text{O}$	4600	48.1
$\text{CaSO}_4 \cdot 2\text{H}_2\text{O} = \text{CaSO}_4$ soluble anhydrite + $2\text{H}_2\text{O}$	6150	64.4
$\text{CaSO}_4 \cdot 2\text{H}_2\text{O} = \text{CaSO}_4$ beta soluble anhydrite + $2\text{H}_2\text{O}$	7210	75.4
$\text{CaSO}_4 \cdot 2\text{H}_2\text{O} = \text{CaSO}_4 \cdot \frac{1}{2}\text{H}_2\text{O}$ hardwall plaster + $\frac{3}{2}\text{H}_2\text{O}$	4230	44.3
$\text{CaSO}_4 \cdot 2\text{H}_2\text{O} = \text{CaSO}_4 \cdot \frac{1}{2}\text{H}_2\text{O}$ casting plaster + $\frac{3}{2}\text{H}_2\text{O}$	4130	43.2
(Calculated B.t.u./lb.—gram formula mass ÷ molecular weight x 1.8; e.g., 4030 ÷ 172 = 23.43 B.t.u./lb.)		
	172	

Table IV. Important heats of hydration

Material	pH
San Marcos gypsum, Lower Calif.	7.8
Plaster City gypsum, Calif.	7.0
Gerlach gypsum, Calif.	7.8
Pure selenite from Gerlach, Calif.	7.0
Alabaster gypsum, Alaska	7.0
Anderson deposit, Gerlach, Nevada	6.1
Gypsite Clark Co., Nevada	7.7
Set dry gypsum (one year old)	7.0
Newark synthetic gypsum	6.6
Plasters:	
Alpha $\text{CaSO}_4 \cdot \frac{1}{2}\text{H}_2\text{O}$ (from Alaska gypsum)	5.10
Alpha $\text{CaSO}_4 \cdot \frac{1}{2}\text{H}_2\text{O}$ (from U.S.B.M.)	5.25
Beta $\text{CaSO}_4 \cdot \frac{1}{2}\text{H}_2\text{O}$ (from U.S.B.M.)	4.85
Soluble anhydrite $\text{CaSO}_4$ (from U.S.B.M.)	4.80
Hardwall plaster stucco made in kettle, San Marcos rock	6.50
Hardwall plaster stucco made in kettle, Gerlach rock	6.50
Hardwall plaster stucco made in kettle, Plaster City rock	6.40
Casting plaster stucco made in kettle, Plaster City rock	6.60
Fibered hardwall plaster at 10 min.	11.60
Fibered hardwall plaster at 1 hr.	10.40
Fibered hardwall plaster at 24 hr.	7.00

Table V. Hydrogen ion determinations on various samples of gypsum and plaster

## Crushed Stone



Aerial view of limestone crushing plant

**Louisville Crushed Stone Co. uses small blasting charges in producing high tonnage adjacent to Louisville city limits**

# Operation of High Production Limestone Mine

**S**TEADY REFINEMENTS in method of operation and material flow have enabled Louisville Crushed Stone Co., Louisville, Ky., to attain a production figure of 250 t.p.h. at its underground limestone operation. This company is a subsidiary of Ralph Rodgers Co., Bloomington, Ind.

Operations at this site were begun as a quarry in 1935. By the time a four-acre area had been worked out to a depth of 90 ft., it became obvious that an underground operation would be the best course for future action. Vibrations caused by blasting were perhaps the major factor in this decision as an underground blast is less noticeable on the surface than an open quarry blast. The operation is less than six miles from the center of Louisville.

In addition to the opening of the first mine entry in 1942, a large primary jaw crusher was located in the quarry in 1948, with minus 4-in. material being transferred by belt conveyor to a 1700-ton surge bin. The surge bin is a cylindrical steel bin, also located on the quarry floor, which feeds the plant at surface level via a belt conveyor on 250-ft. centers. Originally, material was trucked to the surface plant. An intermediate step saw a smaller primary crusher located in the quarry, with sized stone being delivered directly to the plant by belt conveyor without the benefit of a surge bin.

Pattern of work in the mine is well planned and organized, with 10 entries being worked simultaneously by seven crews. In this way, all equip-

By DAVID MOCINE

ment is in use every day and the various operating crews became proficient in a given type of work, since they do not have to change over. Rotation of crews at any one working face is as follows: first the scalers come in, operating from two large Liberty scaling trucks, each with a 40-ft. boom, and two smaller Ford scaling trucks, each with a 14-ft. boom. Next in order is a 1-cu. yd. Lima shovel, powered by a Cummins diesel engine, and designated as a clean-up shovel. Material

is loaded to one of a fleet of three 15-ton rear-dump Euclid diesel trucks that haul all mine-run stone to the primary crusher. A Caterpillar D-8 diesel-powered dozer aids in clean-up work. Next in sequence come the drillers, operating five Ingersoll-Rand wagon drills which sink horizontal holes from 12 to 18 ft. in depth.

### Drilling Procedure

Drilling pattern in this mine takes into account the proximity of the city of Louisville. Five holes are drilled, from bottom to top, in rows extending across the face being worked. Faces of entries usually are 65 ft. in width,



General view of room and pillar workings of limestone mine

## CRUSHED STONE



Left: Scissors work on 75-ft. wide, 24-ft. high face. Right: Drilling and loading operation

with pillars between being 50 ft. in width. Height of ceiling is 30 to 26 ft. from mine floor. Only one vertical row, or five holes, is shot per blast, simultaneously, using a total of 25 lb. of powder. (See accompanying chart for details of drilling.)

Following the drillers, the holes are loaded and the blast is fired, after which the final crew working the same face takes over. The final stage is loading the stone to three 15-ton trucks by a 2-cu. yd. Lorain shovel powered by a Caterpillar RD-8 diesel engine. Haul to the primary crusher is approximately  $\frac{3}{4}$  mile.

An Ingersoll-Rand jackhammer is used for drilling secondary shots, which usually total 25 per week. Compressed air for all mine operations is piped down into the mine from a compressor house located at ground level, well back from the face of the quarry. An extensive system of  $2\frac{1}{2}$ -in. pipe carries air throughout all the workings, with drill rigs and jackhammer hoses being connected to the system at the closest point to the face being worked. The compressor house contains one Ingersoll-Rand compressor rated at 750 c.f.m. and one Sullivan compressor rated at 500 c.f.m. An exhaust fan, rated at 200,000 c.f.m., also is located at a separate point on the surface above the mine, with a vertical shaft connecting it to the workings. It is stated that this fan changes the air in the mine completely once every hour. It is powered by a 50-hp. motor. Five electric auxiliary fans are located at various points in the mine to keep air circulating.

The 600-ft. strip of road from the mine entrance to the primary crusher across the quarry floor is kept free of snow in winter time by a Caterpillar No. 12 Motor Patrol. This unit is used year round in maintaining mine and plant roads. All repair and maintenance work on the company's large fleet of rolling stock is carried out in

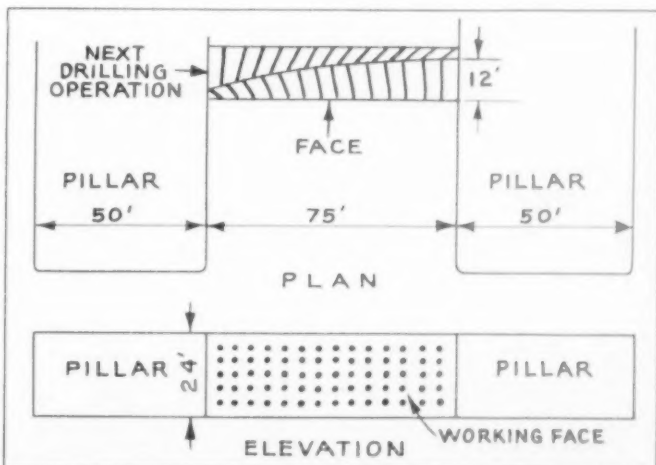
one room of the mine. Here are located all the machinery and equipment necessary for this work.

### Crushing and Screening

Primary crusher to which the 15-ton mine trucks dump is a 42- x 48-in. Traylor jaw, powered by a 200-hp. motor and set for 4-in. discharge. This crusher is fed by a 4- x 20-ft. apron feeder of the same make, powered by a 15-hp. gear-in-head motor and chain drive. Crusher discharge is collected on a 30-in. belt which elevates the material 63 ft. in 200 ft. of travel. This conveyor belt is powered by a 30-hp. motor. From the discharge end of this belt, minus 4-in. stone falls into a 1700-ton cylindrical steel silo that acts as a surge bin to even out flow of stone to the plant at surface level. Under the surge bin material is transferred

to a 30-in. belt conveyor on 250-ft. centers by a Jeffrey electromagnetic pan feeder for transfer to the plant. Belt No. 2 is powered by a 40-hp. motor and elevates stone a distance of 90 ft. to a 3- x 6-ft. Seco vibrating scalping screen, fitted with 3-in. square mesh.

Oversize on the screen is chuted to a Traylor 3-ft. gyratory crusher, set for 2-in. discharge. Crusher discharge plus throughs from the screen are collected in the boot of a bucket elevator on 73-ft. centers powered by a 40-hp. gear-in-head motor. Capacity of both belts Nos. 1 and 2 and the bucket elevator is 250 t.p.h. Discharge from the elevator falls on to a 4- x 10-ft. four-deck Robins vibrating screen. The top two decks are divided and carry  $2\frac{1}{2}$ - and 3-in. mesh and 2- and  $1\frac{1}{2}$ -in. mesh, respectively. The third



Drilling pattern for two consecutive blasts in mine

## CRUSHED STONE



One of two bucket loaders used in stockpile area for reclaiming material

and bottom decks carry 1- and  $\frac{1}{4}$ -in. screen cloth, respectively.

Oversize on the top deck of this four-deck screen goes to a distribution box that was designed by Louisville Crushed Stone Co. At this point, a conventional flop gate was quickly worn out due to velocity of the stone, and so the present distribution device was built. It consists of a steel box with replaceable steel liners, out of opposite sides of which round chutes extend. These chutes have manually-controlled slide gates that effectively cut off the flow when desired. The box has several inches of stone in it at all times so that incoming stone impinges on stone, saving wear on the steel liners. From this point stone may be directed either to a  $1\frac{1}{2}$ -ft. Traylor gyratory crusher, set for 1 in., powered by a 50-hp. motor, which discharges to the boot of the first elevator in a closed circuit, or to a 15-ton capacity surge bin. Under the surge bin a Jeffrey electromagnetic pan feeder gov-

erns feed to a 4-ft. Symons short-head cone crusher, set for  $\frac{1}{2}$ -in. discharge. When the amperage to the motor drive on this crusher is high, indicating a full load in the crusher, current to the feeder is cut down, reducing the load. When the load in the crusher is light and the amperage goes down, the feeder is activated to pass more stone. This system is automatic and continuous. Discharge from this crusher is collected in the boot of the bucket elevator, No. 2, operating on 60-ft. centers, which dumps the stone on to a 5- x 14-ft. Robins triple-deck vibrating screen. Oversize from the first deck, plus  $\frac{1}{2}$ -in. material, is returned to the 4-ft. crusher in a closed circuit. Oversize from the next two decks, plus  $\frac{3}{8}$ - and plus  $\frac{1}{4}$ -in. stone, respectively, falls to truck hoppers as finished material. Throughs from the bottom deck, minus  $\frac{1}{4}$ -in. material, are binned as agricultural limestone.

Oversize on the second deck of the four-deck screen (the first screen

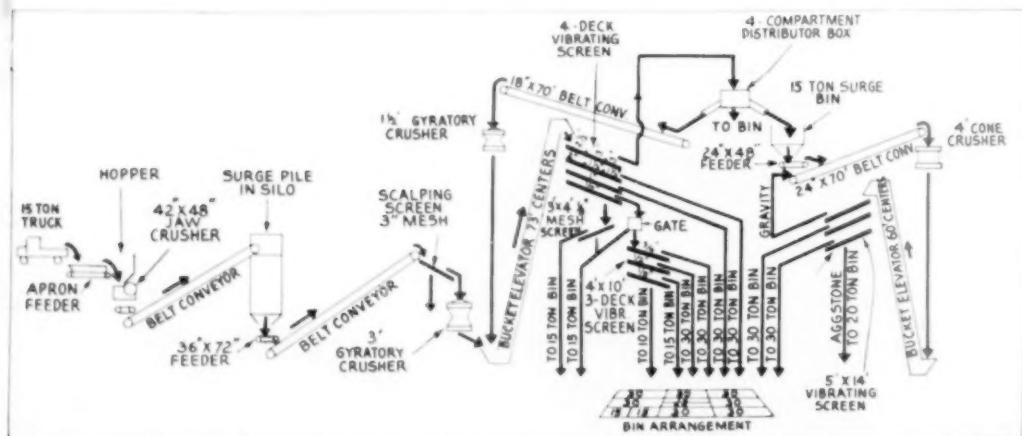
after the scalping screen in the plant), plus 2-in. stone, as well as that from the third deck, plus 1-in. stone, are binned as finished material. Oversize from the bottom deck, plus  $\frac{1}{4}$ -in. material, goes to a flop gate where it may be diverted either to a bin as finished material or over a 4- x 10-ft. triple-deck Robins vibrating screen. This screen carries  $\frac{3}{4}$ -,  $\frac{1}{2}$ - and  $\frac{1}{4}$ -in. mesh on the three decks. Oversize on all three decks as well as throughs from the bottom deck are directed to separate hoppers as finished material. Throughs from the bottom deck of the four-deck screen, minus  $\frac{1}{4}$ -in. stone, fall to a 3- x 4-ft. Niagara low-head screen fitted with  $\frac{1}{4}$ -in. screen cloth. The two separations from this screen are binned in separate compartments as finished material.

### Bin Structure

Truck hoppers at this plant are set up in a square pattern (see sketch), with nine 30-ton capacity divisions in the basic design. Two of these 30-ton bins are subdivided, one into two bins of 15-ton capacity each and one into a 10- and a 20-ton bin. Trucks are loaded out from these bins and surplus material is trucked to the stockpile area. Total production of this plant is hauled in trucks, with most deliveries falling within a 30-mile radius from the plant. The company operates a total of 15 Ford trucks, all mounted with Hercules 6-ton dump bodies, for deliveries or stockpiling of stone. Two Hais bucket loaders of 3 cu. yd. per min. capacity each are operated in the stockpile area for loading out stockpiled material.

The compact arrangement of truck hoppers at this plant has dictated an interesting method for letting truck drivers know which bin is to be drawn from next. On the side of the bin

(Continued on page 70)



Flowchart of Louisville Crushed Stone Co. crushing plant

**New Zealand agricultural limestone producer uses standard rubber-tired tractor to push rail quarry cars to crusher**

By H. J. B. TOPP\*



Quarry cars are pulled down incline, giving maximum protection to men working below

## HAULAGE BY RAIL AND RUBBER TIRES

**A**N INTERESTING VARIATION of quarry hauling methods has been devised by a "down under" firm, The Farmers' Mauriceville Lime Co., Ltd., Mauriceville, New Zealand, producer of agricultural limestone. Standard rubber-tired tractors are used to push quarry cars over a narrow gauge rail line instead of using locomotives running on rails. The company's experience indicated that for its haul of 600 yd. up a grade of 1 ft. in 23, standard dump trucks would not stand up as

well due to the continual first or second gear work necessary.

For short hauls up to 250 ft., it was found that a dump unit built on a tractor was quite successful. The New Zealand firm has a 3-cu. yd. Aveling-Barford dumper, an English make, built on a Fordson tractor which has done excellent work. Beyond the 250 yd. limit however, it could not keep up the 200 t.p.d. demand required. It hauls approximately 150 tons daily, consuming 11½ gal. of gasoline for the 250 yd. Three of these units and 3 men would be required to haul 200 t.p.d. over 600 yd.

The high cost of dumping units, maintenance, depreciation, fuel and additional labor prompted the company to look for less expensive methods of hauling. Rail haulage was found to answer many of the problems, but locomotives presented another problem. They rely on weight for their traction on the rails which is not objectionable on the level, but on a steep grade its own weight reduces the payload proportionately. It was suggested that a rubber-tired locomotive in the form of a tractor might work. This was tried and found most suitable for the particular requirements.

Two Case tractors were purchased for £600 (£1 is \$2.83 in American currency), ten 3-cu. yd. quarry cars for £150 each, and rails and ties for £500, a total of £2600. One tractor is used in the quarry and one spots and shunts the finished product on and off the main railway siding. If one tractor is temporarily out of commission, the other is able to carry on both jobs; if one car requires repairs, it can immediately be replaced by another. The consequence is that the quarry haulage is continuous and efficient and the equipment lasts indefinitely because the load is not on the tractor or the rubber tires. It is also safe since the tractor is able to move away from any danger point and also is generally easier on the driver.

One tractor using 6 gal. of gasoline per day can easily handle 200 tons over the distance of 600 yd. (350 of which are at level grade), requires but one driver, one crusher installa-

(Continued on page 109)



Three quarry cars are being loaded while another three, not shown, are on way to crusher





General plant view showing dryer, left, and 362-ft. covered conveyor which serves screening plant, right, located over three reinforced concrete silos

**Browtown Silica Co., Hanover, Wis., operates efficient 40-t.p.h. plant producing dried silica sand for foundry**

USE

## Producing Silica for Foundries

THE SILICA FOUNDRY-SAND processing plant of Browtown Silica Co., Hanover Division, Hanover, Wis., is located on right-of-way property of the Chicago, Milwaukee, St. Paul & Pacific railroad. This compact 40-t.p.h. plant is laid out in a straight line with finished material being chuted to rail car loading silos under the final screening station. No washing of sand is required at this plant. Quarry-run material is trucked to the plant, a distance of  $\frac{3}{4}$  mile, in a 10-ton truck which averages four round trips per hour.

Operation of the Hanover quarry was taken over by Browtown Silica Co. management in December, 1948. Prior to that time, quarry and shipping operations had been carried out at this site on a small scale only. Present management has built an entirely new plant and also has installed new equipment in the quarry.

### Drying Unit

Principle unit of processing equipment at the new plant is a 5-ft. dia. x 25-ft. long oil-fired rotary dryer which is powered by a 25-hp. motor through a chain drive. A second 25-hp. motor powers the oil-burner and fuel-pump assembly. No. 2 fuel oil is used. The operation requires 5,300,000 B.t.u. per hr. for a temperature of 215 deg. F. At the discharge end of the dryer, the final 10 in. of length for the entire circumference is fitted with  $\frac{1}{2}$ -in. mesh to act as a scalping screen. Oversize, plus  $\frac{1}{2}$ -in. material, is chuted to a 10-in. Stover hammer-

mill set for  $\frac{1}{2}$ -in. discharge. Material passing the crusher is returned by a short belt conveyor to the dryer in a closed circuit.

### Screening Section

Throughs from the dryer scalping screen, minus  $\frac{1}{2}$ -in. material, are collected on a 24-in. covered belt conveyor on 150-ft. centers for elevation to the final screening plant which is located over three reinforced concrete silos at a point 62 ft. above ground level. Sand is discharged from the plant belt conveyor to a 5- x 6-ft. rec-

tangular box, 5 ft. deep, with a 6-in. round hole in each bottom corner. These four holes are connected to four fully-enclosed vibrating screens by flexible metal hose. Since the sand entering the box is dry, no other form of proportioning device is needed.

Each of the four identical screens, driven by individual 3-hp. motors through V-belts, was fabricated in the company shop. Dust collection at this installation is accomplished by an exhaust fan connected to all four screen hoods. It exhausts to a cyclone dust collector. This fan is driven by a 15-



Overall view of quarry. The 24-cu. yd. shovel is used to load 10-ton truck for  $\frac{3}{4}$ -mile haul to plant

hp. motor and has a capacity of 4000 c.f.m. Each of the three separations coming from the four screens is chuted to separate silos, which are 14 ft. dia. x 40 ft. high and hold a total of 280 tons each.

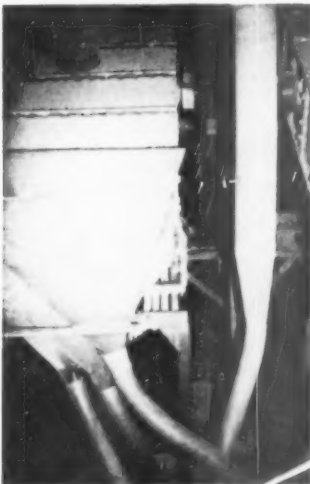
### Quarry

The quarry is located on a 40-acre tract owned by the company. This deposit is of St. Peter sandstone. Present face at the quarry is about 90 ft. high. The quarry floor slopes down toward the back of the operation, as it has been ascertained that a minimum of 40 ft. of good stone lies below present quarry floor. A wagon drill sinks 3-in. dia. holes that bottom at 24 ft. Drilling is done by contract. An average of 100 holes are shot per blast with Primacord and a hand-operated magneto. Each blast brings down about 20,000 tons of stone. Four blasts are shot per year.

### Loading

A  $\frac{3}{4}$ -cu. yd. Unit power shovel loads stone to a 10-ton White end-dump truck for the haul to the plant. The shovel is powered by an 8-cylinder Chrysler gasoline engine. At the plant the truck backs up a ramp to dump to a 25-ton hopper fitted with a Lippmann pan feeder which delivers material to a 26-in. belt conveyor on 40 ft. centers. This belt, which also receives crusher-run material, discharges into the dryer. Frozen lumps in the quarry-run material in winter months require a higher temperature in the dryer, but give little trouble in the hammermill due to the high temperature of feed material.

All shipments of finished material



One of four fully-enclosed vibrating screens. Note flexible tubing to direct three sizes from two decks to three respective silos. Tube to right returns dust from collector to silo



Ten-ton truck dumps to 25-ton hopper. Pan feeder below hopper serves belt, right, which ascends to dryer



Closeup of dryer installation, and hammermill for reducing oversize and returning it to dryer feed belt via short belt ascending to right from crusher

from this plant go out by rail, with loading of cars being accomplished by gravity from the silos immediately adjacent to the rail siding. Shipments are made in box, open gondola or covered hopper cars, depending on specifications of the customer. All production of this plant as well as that of the much larger Browntown operation (see *ROCK PRODUCTS*, October, 1942, page 61) is distributed through a Chicago broker, Wehenn Abrasive Co.

### Personnel

Officers of Browntown Silica Co. are: P. W. Palmer, president; Olive Palmer, vice-president; and Esther Palmer, secretary-treasurer. Arthur Natter is plant manager of the Hanover division.

### El Salvador Cement Plant

CEMENTO DE EL SALVADOR, S. A., a corporation recently organized with private U. S. and Salvadoran capital, has reported that according to its present schedule it would produce cement by January, 1951, thus supplying El Salvador with its own cement industry. The new plant will be of modern design, according to *Mineral Trade Notes*. First shipments of machinery and equipment were expected to arrive in El Salvador during the last of 1949 or the first part of 1950. The plant will be powered by a 1000-hp. diesel-electric power plant and will provide employment for about 100 workers. A United States engineering firm will erect the plant and operate it for one year, after which that company will turn the plant over to local operating men.

The plant, with an annual capacity of 850,000 bags, is expected to meet El Salvador's requirements for cement, which during the past 5 years have averaged 650,000 bags per year. Consumption is gradually increasing and officials of the company believe that the entire output can be sold locally. For this reason they are not planning to seek an export market.

### Nevada Pegmatites

PEGMATITES of the Errington-Thiel mine, Elko County, Nevada, are the subject of a U. S. Geological Survey just completed by E. N. Hinrichs. The report covers an area 300 by 500 ft. in Dawley Canyon, on the east side of the Ruby Mountains, and deals with the mineralogy and paragenesis of three pegmatites that intrude the Prospect Mountain quartzite of Lower Cambrian age. A map on a scale of 1/240 accompanies the report. This report has been placed in open file for public inspection in the General Services Building, Washington, D. C.

# Cement



West side of Tokuyama Soda Co., Ltd., cement mill showing, left to right, stack, electric precipitator house, calcinator house, raw material storage

## CEMENT PRODUCTION IN JAPAN

**Occupation policies and results of war-time damage have limited production in face of heavy demands for construction in the years ahead**

**J**APAN, once the fourth or fifth largest producer of cement in the world, still has a usable plant capacity of more than 5,000,000 tons a year. War damage was slight and for the most part has been fully repaired. Actual production at present amounts to only about 50 percent of usable capacity and about 30 percent of installed repairable capacity. The failure to fully utilize capacity results from lack of fuel and other materials and lack of incentive to produce under the multitude of price and other controls we have imposed on the country.

Although a prewar exporter of cement at a rate of more than a 1,500,000 tons a year at peak, only insignificant quantities have been shipped since 1945. Potentially, however, Japan can supply most of the cement needs of the orient at prices more than competitive to western sources.

### Development of the Industry

The first cement plant in Japan was constructed by the government shortly after the country was opened by Commodore Perry. Privately-owned plants followed, and by the end of the nineteenth century Japan was exporting cement to adjacent Asia. Rotary kilns were introduced in 1903.

Major impetus was given the ce-

By **JOSEPH Z. REDAY**

ment industry in Japan by World War I which removed foreign export sources of cement for the orient, and the Tokyo-Yokohama earthquake of 1923 which boomed cement output for reconstruction.

Large expansion of the industry, however, came in the 1930s. Produc-

tion increased from about 3,000,000 tons in 1931 to more than 6,000,000 tons in 1940 and exports nearly doubled in the same period, mostly to the empire areas and to newly conquered Manchuria. Production capacity kept well ahead of demand, increasing from something over 5,000,000 tons a year to more than 14,000,000 tons in the above period, more than half of it idle.

Japanese cement output dropped



Seichu-Maru, 3400 metric ton cement tanker, is loaded in 24 hr. and unloaded in the same time

ROCK PRODUCTS, May, 1950



house with kiln in front, clinker storage house, burner and cooler house in front, coal storage section, and coal mill and dryer house in front

throughout the war to less than 3,000,000 tons in 1944, chiefly as a result of diversion of both fuel and transportation to higher priority war purposes. The proportion of portland cement out of the total also fell into a steady decrease beginning well before the war. Portland cement constituted 95 percent of all cement produced in 1935, but had dropped to between 65 percent and 75 percent of the total by the end of the war.

Plant capacity was reduced from the peak mentioned above of more than 14,000,000 tons a year in 1939 to less than half that at the end of the war. Most of the reduction in aggregate plant capacity resulted from the shipment of kilns and other equipment overseas. No new plant construction or installation of additional capacity has been undertaken since before the war.

As of the present postwar period, cement producing capacity is contained in 37 plants, nearly all on tide-water. Dispersion of capacity is not entirely economic, the heavier concen-

tration remaining in the older industrial centers of Osaka and northern Kyushu. Total kiln capacity is probably in the neighborhood of 10,000,000 tons a year. Although the balance between kiln capacity and that of grinding and auxiliary equipment is distorted in some plants by reason of wartime dispersion of equipment, the aggregate capacity all around totals about the above figure of 10,000,000 tons a year. Given sufficient incentive to produce, it may be assumed that the Japanese could repair and relocate enough equipment to produce cement quickly at that rate.

Individual plants vary from about 2000 tons of kiln capacity a month to the 87,800 tons per month design capacity of the Osaka Yogyo plant. The median size of plant is between 20,000 and 25,000 tons per month.

#### Methods and Equipment

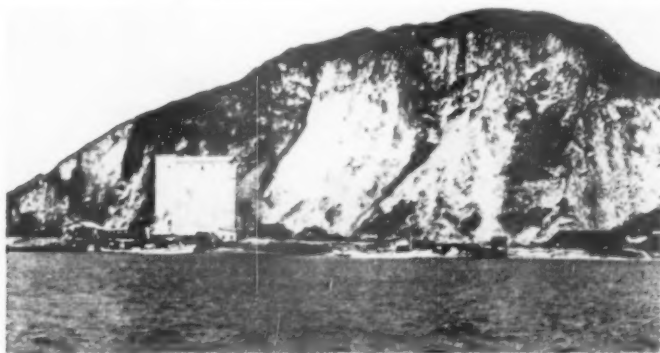
As stated above, the Japanese cement industry produced better than 95 percent portland cement and only insignificant quantities of other types

up to the post World War I period. Output of other types, however, increased from 600,000 tons in 1925 to a level of more than 1,500,000 in 1940. The decline of cement production during the last war took place principally in portland cement. Silica cement increased to a peak of 650,000 tons in 1943, and blast furnace cement to a peak of 850,000 tons in the same year. Non-construction cement reached a maximum of a little over 100,000 tons in 1942.

Japanese methods for producing portland cement generally follow those of the United States and Europe, which areas have provided both technology and prototype plants. Coal, limestone, clay and between 2-3 percent gypsum are the raw materials. The mix is burned to a clinker just before fusion, then pulverized. Both ordinary portland and early hardening and low heat portland cement are produced by nearly all plants according to market demand.

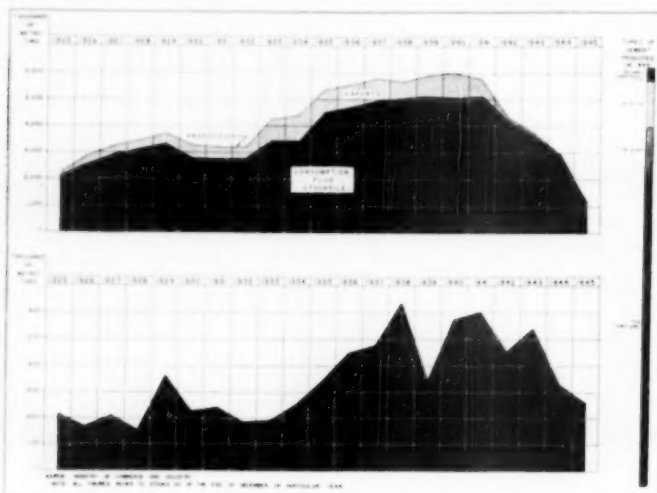
The wet process of portland cement manufacture was introduced into Japan early in the 1930s when all of the Japanese industry underwent rapid modernization. Of the industry at present, there are 25 dry process plants, 7 wet process plants and 4 which use both processes.

"Silica cement" is produced in Japan by mixing about 70 percent portland clinker and 30 percent silica material, adding either gypsum or lime or both. Blast furnace cement is produced in the general area of the steel industry of northern Kyushu. About 60 percent portland cement clinker is mixed with 40 percent blast furnace slag, the proportions depending mostly on the availability of slag. One plant in Japan formerly made a premium, high alumina cement using electric furnaces. The future of this type cement will depend upon the ex-



Limestone crushing plant

## CEMENT



Cement production and exports in Japan, above, and cement and clinker stocks, below—metric tons

tent of activity in the light metal industry and the availability of alumina.

Standard specifications for Japanese ordinary grade portland cement provide a specific gravity of not less than 3.05 and a compressive strength of 70 kg. per sq. cm. after seven days. These not very stringent requirements were modified during the war, compressive strength being reduced to 30 kg. per sq. cm. for ordinary portland after seven days. Postwar demand for cement by the U. S. Army in Japan led to separate specifications for cement produced for Army use. Under these specifications the specific gravity must be between 3.10 and 3.25 and the compressive strength for ordinary portland cement must be 2000 p.s.i. after seven days—a considerably higher figure than that for Japanese use.

About one-third of the kilns in Japan are of Japanese manufacture based usually on Danish, American or German design. The balance have been imported from the three countries mentioned. Roughly the same ratio prevails in raw grinding and finished grinding mills, with the same overseas sources of imported equipment. The bulk of the Japanese mill and kiln production is centered in one firm, the Kobe Seikoshu. The totals for all equipment in Japan are 84 kilns, 132 raw grinding mills and 120 finished grinding mills. Median length of kiln is about 150 to 175 ft.

It is difficult to compare Japanese technology in cement manufacture with that in the United States, since so much depends upon the availability and quality of fuel. Generally, Japanese industry is not as quality conscious as western industry and is weak on instrumentation and heat control in continuous process operations. The above plus inadequate combustion en-

gineering and the poor quality of coal used has resulted in a coal consumption of better than 800 lb. per ton of cement produced since the end of the war. While this coal consumption is 20 percent or more higher than American practice it probably reflects mostly the very low grade fuel used. Low calorie fuel also has resulted in inadequate fusion of the clinker and lack of homogeneity in the product.

Japan is adequately supplied with limestone, although the deposits are not as widely dispersed as would be desirable for the cement industry. Clays are abundant and gypsum of a somewhat less than desirable grade is found in adequate quantities. Under normal conditions, bituminous coal of the better than 5500 calories per kg. grade required for cement production would be ample. Japan has little or no anthracite coal or pitch coke for mixing with low grade bituminous.

Production of cement came to a standstill in Japan at the end of the

war and remained virtually so for a period of months during the acute coal shortage of the fall and winter of 1945-46. Stocks of cement at the end of 1945 amounted to less than 100,000 tons.

The demand by the U. S. Army for cement in carrying on its extensive construction program in Japan became evident in early 1946. Since Army demand had first priority under occupation rules, the cement requirement resulted in increased allocation of coal to the cement industry. Production in 1946 was somewhat more than 900,000 tons and in 1947 about 1,250,000 tons.

Slackening of Army demand simply allowed some fulfillment of long pending needs for cement on the part of the Japanese economy. Roads, dams, housing and all other forms of reconstruction constituted a tremendous pent up requirement for cement. The total possible consumption of cement is indeterminate since the amount available is still far below even urgent needs, but it is probable that close to 10,000,000 tons of cement a year could be used advantageously for the next ten years. By that time the Japanese population will be in the neighborhood of 90,000,000. With attendant scarcity of timber resources, it is probable that the future cement requirement in Japan will remain about 10,000,000 tons a year.

### Present Status of the Industry

The present production of about 2,500,000 tons a year represents the upper limit on availability of fuel, grinding balls, bags and transportation from domestic resources, and is completely inadequate for any sizable reconstruction of Japan's bombed out cities and worn out roads and utilities.

Unfortunately for the Japanese, American occupation authorities in Japan seem to show little interest in the possibility of rehabilitating the Japanese cement industry and getting it back into production on a basis of export sale with the help of foreign capital. There seems to be little awareness that cement, like steel and



Packing plant of Ube Cement, Osaka



a few other commodities, has been in very short supply for the past three years, hence is readily salable. Japan probably is the only country in the world where cement plants have remained idle during these years of high profit production and sellers' market.

A little over 200,000 tons of portland cement have been exported from Japan since occupation of the country, but the quantity is negligible compared to the capacity available. American firms which have attempted to produce cement in idle Japanese plants on a share basis whereby the fuel and bags would be provided by the American firm, have been firmly discouraged by the occupation authorities.

The Japanese plant owners have likewise shown little interest in increasing cement production, mostly by reason of the fact that the official controlled prices of cement fail to cover the actual costs of production. There is no incentive to plant owners to produce for export since the specifications are more rigid and the producer receives only the official price in Japanese yen. All of the dollars or other foreign exchange accruing from export sales goes into the account of a government foreign trade monopoly. Management usually prefers to produce cement for barter domestically, the cement-coal barter being highly regarded although forbidden by occupation regulations. While forbidden, the barter of cement like that of other commodities remains the only indicator of market values.

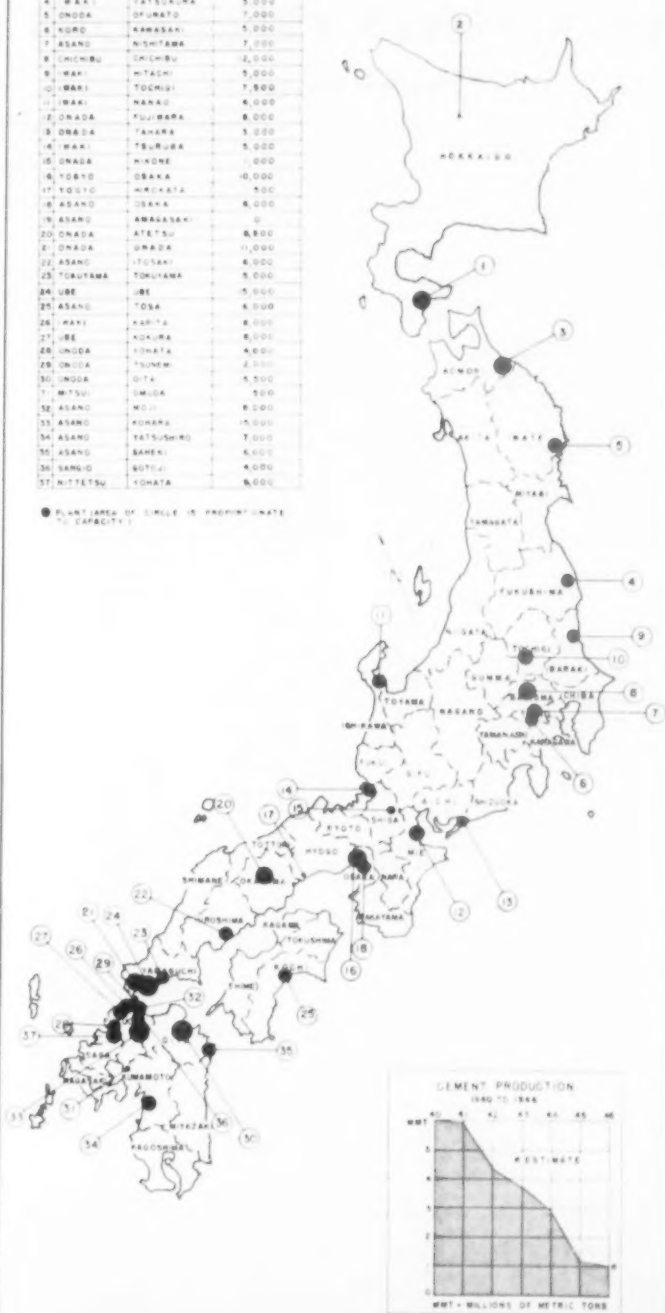
The cement production level in Japan will probably remain at its present 2,500,000 tons a year during the period of occupation control, since it is unlikely that sufficient incentive or enterprise will appear in the type economy being enforced there. Any slackening of control, however, probably would be followed by a considerable increase in output. Cement can be produced profitably in Japan unlike many other subsidized industries. The demand for cement in the entire Pacific and Asiatic area is enormous. End of warfare in China and resumption of trade by that country would again make cheap coal available to Japan. A return to a relatively uncontrolled economy in Japan could do the same by increasing domestic coal output to its prewar level which would provide all of Japanese industry with an adequate fuel supply.

Either development would enable Japan to cut the cost of cement production by a sizable amount. Labor costs in cement manufacture are not great, nor are the costs of limestone or other raw materials; inland transportation is relatively cheap. Fuel availability and cost would be the only deterrents to large scale and very stiff competition by the Japanese cement industry in the export trade of the Pacific.

RIGHT:  
Locations and capacities of Japanese cement plants

NAME OF COMPANY	FACTORY	MONTHLY CAPACITY (METRIC TONS)
1. ASANO	FAMUSO	1,000
2. ASANO	SHIBETSU	500
3. HAKI	HACHINOHE	1,000
4. HAKI	YATSUKURA	5,000
5. ONODA	ONURATO	7,000
6. KURO	KAWASAKI	5,000
7. ASANO	NISHITAMA	7,000
8. CHICHIJU	CHICHIJU	2,000
9. HAKI	WATASHI	5,000
10. HAKI	TOCHIGI	7,000
11. HAKI	NANAO	6,000
12. ONODA	FUJIMURA	6,000
13. ONODA	TAHARA	3,000
14. HAKI	TSURUGA	5,000
15. ONODA	KIKONE	1,000
16. TOKYO	OSAKA	10,000
17. TOKYO	KAWAKATA	700
18. ASANO	OSAKA	6,000
19. ASANO	AWAKASAKI	500
20. ONODA	ATETSU	8,000
21. ONODA	ONODA	11,000
22. ASANO	ITUSAKI	6,000
23. TOKUTAMA	TOKUTAMA	5,000
24. UBE	UBE	5,000
25. ASANO	TOSA	6,000
26. HAKI	KARITA	8,000
27. UBE	KOJURA	8,000
28. ONODA	YONATA	4,000
29. ONODA	TUNAMI	2,000
30. ONODA	OTA	5,000
31. MITSU	ONODA	500
32. ASANO	MOJI	8,000
33. ASANO	KOHARA	15,000
34. ASANO	YATSUSHIRO	7,000
35. ASANO	SAKURA	6,000
36. SANGI	SUTOJI	4,000
37. NITTETSU	YONATA	6,000

● PLANT AREA OF CIRCLE IS PROPORTIONATE TO CAPACITY



## AIR RECEIVER EXPLOSIONS REAPPRAISED

Chemical research indicates use of rust inhibitors may minimize hazards from air supply tanks

SOME twenty-odd years ago while the writer was in the South on a mission for ROCK PRODUCTS, an air receiver explosion occurred that killed seven men and injured many others. Soon after, this magazine published a short account of the accident including the staff's joint opinions as to what had caused it. (ROCK PRODUCTS, March 16, 1929, page 83).

For several years thereafter short squibs were published and other data giving other people's opinions and views on what caused air receiver explosions. Lately, however, because no great number of people have been killed in similar explosions, the general subject of air receiver explosions has lapsed into a period of torpidity born from a sense of safety that is dangerous. This sense of safety is often exaggerated by down-right ignorance. In one instance recently we found a young compressor operator who had never even heard of an air receiver exploding. Probably when in some remote corner of the United States an air receiver accident should occur again and kill or maim an appreciable number of people, there again will be a flurry of publicity, technical discussions, investigations, and what not.

The trouble of writing to several governmental agencies, insurance companies, etc., to find out the number of air receiver explosions was undertaken recently, but the subject had lapsed to such an extent that none of the organizations contacted had any more records of such accidents, nor did they know of anyone who did. Yet air receivers do continue to explode. A short time ago the writer was visiting a small operation and talking to the management when an operator came in with a foolish grin on his face. He had in his hand a circular steel disc about 12 in. in diameter. He explained that the air receiver on the portable job had just blown out. No one was hurt, however, as no one had been near the compressor at the time. But the steel disc had cut a deep gash in a nearby tree indicating that if a man had been standing at the same place, he would have been cut almost in two.

### Causes of Explosion

It is with the purpose of reviving the general subject before someone is killed that ROCK PRODUCTS here reviews opinions and observations on

By WALTER B. LENHART

this subject, and again points out the dangers that are inherent in this part of any air compressor installation, be it in the larger quarries, in small portable air units, or in the little air receivers that are a part of most filling stations' public service equipment.

### Oil and Oil Vapors

It is generally agreed that oil and oil vapors, or both, are at the root of all compressor receiver explosions and over the years nothing has been advanced to contradict this fact. To it we hold. Just how these oil vapors are ignited was for years a debated subject. One school of thought said that cheap lubrication oils decomposed in the presence of a hot compressor valve and that one of the products of decomposition was acetylene gas. This gas is heavy and could accumulate in some pocket air receivers. This gas is known to explode spontaneously at pressures well below those in most air receivers, and it was pointed out that acetylene in the common welder's cylinder was acetylene in a solvent, which was a horse of a different color. Reasonably concentrated acetylene gas does explode under low pressures, according to the text books. It's just the nature of the material. For years we held to this theory and to correct it we advocated the use of good lubricating oil and to "... installation of the intake and outlet to the receiver in such a fashion that the receiver would be air swept, thereby preventing any heavy acetylene gas from accumulating." This was a good theory until portables came into the picture. It went flat and died when the previously mentioned portable compressor receiver tried to mow down a big pine tree, for the air receiver was about 14 in. in diameter and 3 ft. long, and naturally thoroughly air swept.

### Lack of Water

Another school of thought was that gaseous vapors were ignited by static electricity, which is a loose and indefinite explanation at best. A third theory was that small bits of red hot carbon that could accumulate on the valves of a compressor could be carried into the gas filled receiver, es-

pecially in the older types of compressors where water on the valves was essential to successful operation. It simply held that the operator had forgotten to turn on the water. The explosion in the South previously mentioned helped invalidate that theory, for the receiver was 800 ft. from the compressor and the air zig-zagged through a network of air pipes before reaching the receiver. It would be difficult to understand how a hot spark could travel that distance, and still remain hot enough to ignite anything. Air-cooled compressors possibly helped to do away with that theory also.

### Changes in Pressure

One of the most inane and senseless explanations was the one arrived at by the board of experts that immediately went into session after the southern explosion. After looking at the headless superintendent of the quarry and his six associates, all dead, they came to the weighty conclusion which, in essence, was as follows: "... the changes in pressure within the receiver as air was put into it, and withdrawn, caused a bellow-action on the end of the receiver. This caused the steel at the crimped end to become crystallized and to become weakened to such a degree that failure resulted..." This gave the owners of the air receiver an elegant coat of white wash. Fortunately the explosion had not occurred in a crushed stone operation, but in a dimension stone quarry whose business was based on grave stones, decorative stone, etc.

Oil, oil residues, oil vapors, to our knowledge, played no part in the deliberations of these so-called explosion experts. This theory of "explosions from pressure" became untenable when governmental agencies in western oil fields carried out a series of tests attempting to blow up air receivers deliberately using pressure alone. In the oil fields, it can be explained, it is common practice to have gas and/or air compressors that can supply air at pressures in the 5000 to 10,000 p.s.i. range. Such compressors are used to start air-lift pumping in deep oil wells. Once the column of liquid in the well has been partially lifted by the high pressure gas injected into the low part of the well, other lower pressure compressors, pumping oil-well gas, take over. Be that as it may, in all the attempts

to blow up a receiver there was not one explosion. All failures were of a ripping nature, sometimes equally dangerous, for the high pressure air lines connecting the compressor and receiver would break loose from the receiver and would whip around like a garden hose does when the water is turned on suddenly.

### Reaction with Rust

Last winter we went into a discussion of this subject with no less than four Ph.D.'s, all research chemists, and here in a nut shell is what they held. They were somewhat surprised that the information was not common knowledge. (For simplicity's sake we are taking a few liberties with chemical nomenclature and possibly are seemingly trying to defy some of the laws of nature, but for clarity we gladly stick out our necks again).

"One is used to thinking of iron and iron oxide (rust) as two definite compounds. At one end of the chain is the metallic and bright iron, and it rusts, thereby forming iron oxide which we are used to seeing as  $Fe_2O_3$ , or  $FeO$  at the other end of the chain. The facts of the matter are that in between these two end-points are an infinite number of intermediate iron oxides—a sort of chain, or overlapping growths, that result when oxygen rusts iron. The end points of this growth are the relatively inert oxides above given. BUT, some of these intermediate oxides are catalytic agents, and as such can cause oxygen and oil vapors to unite, often explosively."

Thus one can see that common old rust is at the bottom of this theme. Eliminate rust, or reduce it, (other well known precautions being observed) and the chances of the receiver exploding should be practically eliminated.

It will be recalled here that in the explosion previously referred to there was every evidence that in the old steam boiler used as a receiver with tubes removed, and mounted horizontally, there had been, prior to the explosion, at least two wheelbarrow loads of oil, oil residue, rust, etc., as evidenced by highwater marks in the receiver after the blast.

### Catalytic Agents

The term catalytic agent has been tossed around so much that possibly the greater number of our readers need no dictionary to understand its meaning. However, we can briefly explain that a catalytic agent is something that will cause two chemicals to unite. It can, but often does not, take any part in the reaction itself. It is the match that sets off the explosion.

Having been sold on this rust theory as to its causing air receiver explosions, we studied the patent office files in Washington, D. C., to see what there was new and available in the field of rust inhibitors, and rust preventives, that might apply to this theme.

### Rust Inhibitors

The general subject of rust inhibitors is far too technical a discussion to attempt in this article, but we wish to point out that according to these patents (not to mention advertised claims by the various oil companies that manufacture high grade lubricating oils), there are available chemical compounds that can be put into the lubricating oil used in the compressor, and these additives will definitely stop or retard rust formation in the compressor itself, and in the pipe lines, and what is equally important, in the air receivers.

Still another approach to this important subject is the fact that in this modern age it is possible to get air receivers that are made of steels that are far less apt to rust than the receivers made years ago. No doubt the manufacturers of high class air compressor equipment can supply much information on this subject.

The old fashioned idea of a "blow-off" valve is out as far as protection for an air receiver is concerned, yet many are the operators who put their faith in that gadget. A blow-off, or safety pressure valve would be equally effective if one shot off a box of 60 percent dynamite inside the receiver and expected the valve to release the pressure gradually.

### Reduce Surface Area

We also are inclined to think that the less surface area within the air receiver the better, weighing carefully the amount of air storage required, and to keep that amount as low as compatible with efficient operations. As a corollary to this thesis, the use of old steam boilers with the fire or water tubes still in them gives far too much interior surface area for rust to pile up on and is a needless risk. Therefore the use of such should be condemned.

It is our humble opinion that the receiver should be mounted vertically, and outside the compressor room. (Most of the explosions that have come to our attention were such that one end blew out.) If the top end

could be coaxed into being the obliging offender, the explosion could then amount to having a piece of steel blown into the air. If the bottom part blew out—not so good.

From this discussion it should be obvious that some easy method of removing rust, especially loose rust, should be provided in the installation and design of the receiver set-up.

### Removing Rust

In any event we hold that the air receiver should have a large gate-type, or large opening-type, valve located at the lowest part of the air receiver which can be opened quickly, thus allowing the full volume of compressed air in the receiver to exhaust itself quickly and carry with it any accumulations of water, rust, oil, oil residues, and what not. In this simple expedient lies the greatest hope and safety, and we repeat—keep the rust and oil and oil residues out of the air receivers. Use every precaution that modern science offers to prevent rust in the first place, and to get it out of the receiver as quickly as possible if it does form. It won't hurt a bit to install the receiver so that it is air swept, as such an installation can help prevent pockets of vapors from accumulating, but prevention and removal of rust is far more important, for there is the match that lights the fuse for the explosive mixture that can be in the air receiver under even the best operating conditions. Have a good receiver, built by a reputable manufacturer of air compressor equipment, whose skill in selecting the right steel for the right job stems from a large group of research men whose joint knowledge can be used freely possibly to save life. But remember it is rust that is the enemy and rust inhibitors in oil are a simple and effective and inexpensive form of insurance against the sleeping giant—air receiver explosions. Comments on these remarks are invited.

### Recent Patents

Some patents on rust inhibitors are presented below.

(Continued on page 118)

Date of Patent	Patent No.	Remarks
March 20, 1945	2,371,853	Mineral oil composition. Assigned to Gulf Oil Corp., by Herschel G. Smith, and Troy L. Cantrell.
March 20, 1945	2,371,854	Mineral oil composition. Assigned to Gulf Oil Co. by same inventors as above.
Nov. 26, 1946	2,411,593	Corrosion protection of metals. Assigned to Shell Development Co. by Willis G. Routson.
April 22, 1948	2,419,327	Corrosion inhibitors—nitrate salts of secondary amines. Assigned to Shell Development Co. by Aaron Wachter and Nathan Stillman.
June 3, 1947	2,421,672	Rust preventive composition. Assigned to Union Oil Co. by Chester E. Wilson, and Mary Louise Dodge. This appears to be more of a rust preventing composition, and not an additive for lubricating oils.

## Aged Linseed Oil as Dispersing Agent in Portland Cement Analysis

Research proves advantage of aged linseed oil over oleic acid in turbidimetric determination of portland cement specific surface

By W. J. McCOY\* and  
A. G. CALDWELL†

IN 1936, SOON AFTER the Wagner turbidimeter method for determining the specific surface of portland cement was adopted as an A.S.T.M. test procedure, A. J. Johnson‡ conducted a brief investigation of this test method at the research laboratory of the Lehigh Portland Cement Co. He noted that excessive foaming frequently occurred when oleic acid was used as a dispersing agent for cement in kerosene in the turbidimetric determination of specific surface of portland cement by the A.S.T.M. procedure C 115-34T which was in effect at that time. It was reported by Mr. Johnson that this excessive foaming, which caused erratic results, could be eliminated by the use of an aged linseed oil as a dispersing agent instead of oleic acid as specified by the A.S.T.M. method. He also noted that suspensions with aged linseed oil appeared to be more stable than suspensions with oleic acid. Since 1936 aged linseed oil has been tried as a dispersing agent in this test method by many laboratories and has met with widespread approval.

During the past several years, it has been observed many times that excessive foaming frequently occurs with oleic acid when the relative humidity in the air is high or a trace of water (as little as .01 percent) is present during the dispersion of the cement in kerosene. This is especially true in the case of cements possessing a high fineness. Test data have shown that the interference of foaming encountered with oleic acid has variable effects on the specific surface. When foaming occurs, tiny air bubbles are dispersed throughout the cement suspension and interfere with the normal settling of the cement particles. Sometimes when foaming occurs, fluffy masses or flocs are formed which settle out slowly and result in an apparent increase in specific surface. Data have also been obtained that indicate the possibility of a reaction between oleic acid and the cement since the surface area was found to vary with time of contact of the oleic acid

with the cement suspension. In view of these undesirable characteristics of oleic acid as a dispersing agent, an investigation was made to determine the best dispersing agent for cement in kerosene that was not sensitive to traces of moisture and time of contact with the cement suspension. It is the purpose of this paper to record the findings of this recent investigation which substantiates Mr. Johnson's original investigation in that it shows aged linseed oil to be more satisfactory than a number of dispersing agents, including acid, which is still specified in the present A.S.T.M. Method of Test for Fineness of Portland Cement by the Turbidimeter C 115-42.

### Specific Surface Determinations with Various Dispersing Agents

After preliminary tests and consideration, 17 different dispersing agents were selected and specific surface determinations were made on a given sample of cement using each of the dispersing agents. The first series of tests was conducted when the relative humidity was low and special care was taken to exclude all traces of water during the test. The light intensity was adjusted for each dispersing agent in an attempt to obtain approximately the specific surface value of 1750 cm<sup>2</sup>/gm which was obtained when

the determination was made using oleic acid. Four of these dispersing agents proved entirely unsatisfactory and twelve of them resulted in surface area values within 30 cm<sup>2</sup>/gm of that obtained with oleic acid.

It was not possible to test these twelve dispersing agents under identical naturally occurring humid conditions that would cause foaming with the oleic acid, so dry conditions were selected and then 1 small drop of water or .016 percent (based on 335 ml. of kerosene) was added during the dispersion of the sample in kerosene. Since .005 percent water was found to cause foaming with oleic acid, the .016 percent used was believed to be a rather severe test for a dispersing agent for cement in kerosene to pass without causing a foam to form. When these specific surface tests were repeated with the .016 percent water addition using the twelve dispersing agents and oleic acid which previously had given satisfactory results, aged linseed oil gave specific surface values that checked with those obtained under dry conditions. In four of the cases no effective dispersion was obtained and the results with the other eight materials varied from a decrease in specific surface of 240 cm<sup>2</sup>/gm to an increase of 310 cm<sup>2</sup>/gm. This extreme increase occurred with oleic acid. The following is a tabulation of these test results. All specific surface values in Table I and in subsequent tables are the average of two or more determinations.

If the magnitude of the L is con-

Agent	L	Specific Surface Values, Cm <sup>2</sup> /Gm	
		Dry Conditions	With .016 percent H <sub>2</sub> O
Oleic Acid	19.0	1750	2060
Aged Linseed Oil	20.5	1760	1750
Castor Oil No. 1	21.5	1740	1640
Castor Oil No. 2	20.0	1730	1710
Pine Oil	18.5	1750	poor dispersion
Soy Bean Oil	20.0	1750	1670
Santapour	20.0	1770	poor dispersion
Span 20	19.5	1750	1860
Arlax	poor dispersion	—	—
Nujol	18.0	1750	poor dispersion
Turkey Red Oil	poor dispersion	—	—
Cotton Seed Oil	19.0	1720	poor dispersion
Chinawood Oil	18.0	1750	1770
Dupont B-25	—	flocculation	—
Blown Castor Oil	poor dispersion	—	—
Corn Oil	20.0	1750	1730
Glyco S-7841	15.5	1750	1610

Table I: Effect of a .016 percent moisture with various dispersing agents on the specific surface determination of portland cement with the turbidimeter

\*Director of Research, Lehigh Portland Cement Co.

†Research Chemical Engineer, Lehigh Portland Cement Co.

‡Plant Manager, Mason City plant, Lehigh Portland Cement Co.

sidered to be an indication of the effectiveness of a dispersing agent, aged linseed oil was the only material which was both a good dispersing agent and unaffected by moisture. Corn oil appeared to be almost as good but there was considerable foaming in the presence of a trace of moisture. Chinawood oil was not affected by moisture but was not a good dispersing agent. The two samples of castor oil used did not appear to have consistent properties.

### Specific Surface Determinations with Oleic Acids, Linseed Oils

Before proceeding with the investigation of linseed oil, a series of tests with oleic acid was made to be sure that the observed sensitivity of oleic acid to traces of moisture was typical. Seven different samples of oleic acid including various grades from seven different sources were tested using a different typical cement sample. The same L setting was used for all determinations in this series. From the following table one can readily see that a trace of moisture (.01 percent) caused an average deviation of 240  $\text{cm}^2/\text{gm}$  in the specific surface determination (Table II):

Considerable foaming was obtained with each of the oleic acid samples when a trace of moisture (.01 percent) was present. This foaming interfered to the extent that the first two or three readings had to be estimated because of the presence of air bubbles in the suspension of cement in kerosene.

After demonstrating that sensitivity to moisture was a typical characteristic of oleic acid, ten samples representing raw, boiled and aged linseed oils from various sources were tested

Oleic Acid Sample	Specific Surface (Dry)	Specific Surface (+ .01 percent H <sub>2</sub> O)
1. U.S.P. grade	1530 $\text{cm}^2/\text{gm}$	2010 $\text{cm}^2/\text{gm}$
2. U.S.P. grade	1793	1700
3. U.S.P. grade	1840	1980
4. Technical grade	1800	2410
5. Technical grade	1770	1950
6. Technical grade	1830	1900
7. Technical grade	1860	2320

Table II: Effect of .01 percent moisture with various oleic acids on the specific surface determination of portland cement with the turbidimeter

Linseed Oil Sample	Specific Surface (Dry)	Specific Surface (+ .01 percent H <sub>2</sub> O)
1. Raw	1940 $\text{cm}^2/\text{gm}$	1620 $\text{cm}^2/\text{gm}$
2. Raw	1900	1790
3. Raw	1850	1760
4. Raw	1880	1750
5. Boiled	1850	1930
6. Boiled	1790	1820
7. Boiled	1770	1550
8. Aged	1850	1840
9. Aged	1850	1860
10. Aged	1830	1840

Table III: Effect of .01 percent moisture with various linseed oils on the specific surface determination of portland cement with the turbidimeter

Linseed Oil Sample	Specific Gravity 15° C.	Saponification No.
1. Raw	931	190
2. Raw	934	190
3. Raw	932	191
4. Raw	939	190
5. Boiled	932	191
6. Boiled	932	190
7. Boiled	937	193
8. Aged	932	198
9. Aged	950	198
10. Aged	950	198

Table IV: Properties of aged linseed oils

to determine which type would be the most desirable for use as a dispersing agent and to check on the uniformity of performance of a given type.

The same cement sample was employed in this series of tests as in the oleic acid test series. Inspection of the following test data will show that satisfactorily agreeing results were obtained only with the three aged oils

since in only these cases were uniform results obtained for the various oils and under both dry and trace of moisture conditions. The average deviation in specific surface values caused by a trace of water was 150  $\text{cm}^2/\text{gm}$  for the seven raw and boiled linseed oils while the trace deviation with the three aged type linseed oils was only 10  $\text{cm}^2/\text{gm}$ . (Table III)

Fig. 1 illustrates the foaming action that occurs when oleic acid is used and a trace of moisture is present. Fig. 2 illustrates the absence of foam under the same condition when aged linseed oil is employed.

In the concentrations employed in this determination there is apparently no reaction between aged linseed oil and a suspension of cement in kerosene since identical specific surface values were obtained after one hour standing and a deviation of only 40  $\text{cm}^2/\text{gm}$  resulted after a tank of high fineness cement, kerosene and linseed oil had stood for 20 hours.

### Tests of Aged Linseed Oils

Since the aged linseed oil seemed to be satisfactory, it appeared advisable to make further tests to devise a set of specifications or means of checking on whether a linseed oil was an aged oil or not. In most cases this will not be necessary because aged linseed oil is a uniform type raw material in the protective coatings industry and is a standard product of the linseed oil companies. The following results of these tests showed that

(Continued on page 102)

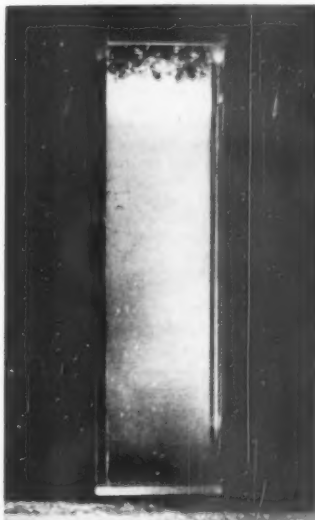


Fig. 1: Oleic acid



Fig. 2: Aged linseed oil



# Dust Control

## Control of Dust by Water Vapor

Importance of dust reduction for protection of health and equipment has led to use of many variations of water sprays easily installed at points of high dust concentration

DUST CONTROL METHODS, which include the use of water, may be installed for the prevention of silicosis or other health hazards, also for the improvement of general working conditions, for the control or removal of a nuisance to nearby areas, and also for the protection of bearings and other machine parts and plant equipment.

Industry is interested primarily in the fines caused by dust generation and dust dispersion. Dust generation is done by crushers, by hammer, rod and ball mills, by falling stone, etc. It consists of the small or microscopic size pieces that are broken off from the parent piece or larger pieces.

Dust dispersion is the spreading of the fine generated material out into the air. This dispersion takes place on fines that were attached to parent material, or fines that have collected in masses, due to various causes and air movements.

The ideal situation would be to have no dust dispersal—an impossibility in practical industry. Dispersed dust therefore must be captured by various means. All of it cannot be captured, but it is desirable to decrease the number of finer sizes to a *harmless minimum* to improve working conditions, even though the dust is known to be harmless.

If we should stop air movement, our dust control problem would be simple, as the fine dust particle sizes must have air movement to travel after they become airborne. We cannot stop air movement in industry, nor would it be desirable as a whole. Heat and the fan action of hammermills, the movement of flywheels, belts, conveyors, falling material and innumerable other actions of pieces of equipment and material all set up air movement within a building even though this building be made tight to facilitate the action of air-dust control equipment. Dust control by air could rightfully be called air control, as the purpose of it is to collect air containing very fine dust, the same as a system would be used for removing gas-contaminated air. The gas alone cannot be removed by ordinary means; the gas laden air must be removed.

Capturing dispersed dust in many cases can be accomplished by air control only. The exhaust from a grinding mill, with its fan action, is an ex-

By ROYAL E. FOWLE

ample. The systems of capturing dispersed fines are many, varying from the commonly used cyclone to electrical precipitation. In some cases the recovered fines have high commercial value; in other cases, as in the average crushed stone plant, the fines are a waste product or are employed for filler material or for other low cost commercial uses.

### Trapping Dust with Water

Gravel and sand production usually is a wet process, except in some arid regions such as in parts of our Southwest and in Saudi Arabia. The dust problem in the average gravel plant generally is slight, even in the crushing operation, where wet, damp, or surface dry washed pieces are reduced in size. The crushing of rock, however, usually being a dry process, causes dust generation, giving off dust that is dispersed by various causes and methods. Cement plants generally have a greater over-all dust problem than crushed stone plants.

The crushed stone producer often uses water at screening operations for washing purposes and to facilitate screening. This is particularly true if stone sand is being produced and there is no need for producing dry minus  $\frac{1}{8}$ -in. material. Such a producer has a greatly reduced dust hazard.

Let us take the operations of a producer of dry crushed rock and the similar activities of a cement plant and pick out or choose a few of the dust generation and dust dispersal operations where the use of water may prove to be beneficial.

The rock loaded by, say, a shovel into quarry trucks generates dust and the air displaced by the moving pieces disperses the generated dust as well as that clinging to the quarried rock. The air displaced by the rock when a truck dumps at the grizzly chute or feeder again causes dispersal of dust. If a heavy wind is blowing during these operations the dispersal becomes more severe.

Some producers have used a night man, or off shift man, to wet down the quarry rock as well as the quarry truck roads to reduce the dust in the

quarry flow operations. Others have also placed vapor, mist or spray nozzles at the grizzly chute or over the feeder.

### Dust Control at Primary Crusher

Next comes the primary crusher with its heat generated by crushing. The air currents rising out of the crusher due to this heat, along with the opposite air currents caused by the fast moving air displacing discharge of material, causes dust dispersal and at times a dust problem. The turbulence and the counter-flow air currents are added to by falling rock feeding into the crusher, in the case of large jaw crushers in particular.

Some producers set vapor, mist or spray nozzles near the crusher opening to dampen the quarry rock before it enters the primary crusher. The surface area of the uncrushed material is small when compared with the same rock after crushing. This condition, coupled with the absorption that takes place along with the heat of crushing, makes it possible to feed rock that is fully surface wet. In a dry plant operation this wetting is placed so far ahead of the finest size screening that little or no screen cloth blinding is caused by the damp material originating at the primary crusher. It is axiomatic in dry screening plant operations that the closer the operation is to the final or finest screening, the lighter must be the particles of water applied near, or to, the material—and the less the amount applied.

Mist or light spray nozzles are at times set at the crusher discharge opening to completely blanket, curtain, or "house in" this opening to prevent the escape of dust.

### Dust Control at Transfer and Feeder Points

The crushed damp material from the primary may discharge to a feeder, conveyor, screen, elevator, etc., and in turn be recrushed, rescreened and further processed to meet the requirements for its final use.

If the finest, or final, screening takes place shortly after primary crushing, then less water must be added at the crusher discharge. Usually, however, the time interval and fur-

## DUST CONTROL

ther processing are sufficient to dissipate the moisture applied at the primary.

Rock traveling on a conveyor has fewer voids than the same rock after its discharge at the head pulley; the stream "expands" and displaces air. The same rock "contracts" again when entering a bunker, a transfer point, an elevator, a screen feed point, etc. All of this causes turbulence, air currents and consequent dust dispersal.

Rock traveling on a belt, sliding down a chute, or falling free drags air with it and induces an air stream. Elevators by their fan action or, if enclosed, by their "chimney" action, cause air currents which in turn produce dust dispersal. The problem at transfer and feeder points, elevator discharge and similar points is to control the air and by so doing control the dust. Reduction of feed openings to a minimum to reduce the entrance of air, a reduction in the speed and distance of fall of rock, the use of surge bins, the use of pressure relief pipes, the housing in of screens, transfer, feed and discharge points along with the use of air control equipment all make for improved dust control.

The field of air control or dust control is beyond the scope of this article, but the control of air must be considered in the use of water vapor, mist or spray. Water forms a supplemental and, at times, a single agent of dust control.

The vapor, mist or spray nozzles should be arranged to form an enclosing curtain of moisture when used at crusher discharge, transfer points, screen feed, elevator feed or elevator discharge. The amount of water, the type of nozzle and the valve control all depend on the size of the material and its location in the production flow sheet. Material to be recrushed can be given more moisture than that which is to be screened without further crushing. The amount of water, its place and type of application, will

of necessity depend on the ease of screening material through the smaller openings—such as 3/16 in., 1/8 in. and .096. The closer the water application to the final screening, the less the amount applied and the finer the application—such as that generated by light fog or vapor nozzles.

Should screen blinding take place, nozzle banks are fully valved off at the screen in question. Cutting down nozzle pressure to reduce the amount of vapor, mist or spray many times causes a nozzle to drip, which produces a moisture concentration and defeats the purpose of water use.

### Reduction of Dust Dispersal

Plant dust dispersal can be reduced by the wetting of uncrushed and crushed material, by air control and by the use of fog, vapor or spray curtains to house in, or "box off," critical openings and locations.

Dust that is already dispersed, the dust that is airborne and possibly hazardous, can be reduced by fog and mist nozzles. The ideal conditions for the moisture control of dispersed dust would be for all particles of dust, microscopic in size or larger, to be brought in contact with many equally small or larger water particles in sufficient number to prevent the dust from staying afloat or being airborne. The fog or vapor particles of water would "sink" the dispersed dust particles on contact.

The extreme example would be to have a heavy fog condition within a rock plant, or a condition similar to a steam room, the vapor being of such density as to cut down visibility. Such a condition was noted in a California plant located where fogs are prevalent at certain times of the year. The dispersed dust was reduced by the fog which was carried to the crushing-screening operations by the prevailing winds. Such an extreme condition, if man-made and prolonged, would be detrimental to operating equipment.

A modification of such a saturated

"fog bound" condition can, however, be put into operation at critical points, such as over screen locations, relief vents from enclosed bunkers, crusher platforms, crusher buildings, etc. Allowance must be made in the nozzle locations to allow for the drift caused by prevailing breeze or induced plant air currents.

### Control of Water Distribution

It is readily realized that the water sprays applied on the quarry rock entering the primary crusher must function only when the crusher is being fed and the rock moving; otherwise, there would be an excess of moisture on the rock surface and in time this excess would be carried into the crusher and through the crusher discharge, to cause damage or prevent efficient operations by forming sticky or slush material in chutes, transfer points and on screen cloth.

A similar condition exists for all nozzle locations at crusher discharges, transfer points, screen feeding points, elevator feed and discharge points and the like. It also exists for those vapor or mist nozzles that are placed at critical plant locations to form "fog" for the purpose of capturing dispersed dust particles.

### Primary Crusher Water Control

Water spray and mist nozzles at the chute or feeder ahead of the primary crusher can be controlled by the crusher feeder or operator. The man stationed there can operate a quick acting valve to control the water not only ahead of the crusher opening but also at the crusher discharge. It is necessary to have the water for primary crushing controlled from the primary crusher location rather than from a device depending on the rock flow at a point along the flow sheet after the primary; the time or material lag would allow too great an amount of water to be placed on the rock ahead of the primary in case of a delay along the line of flow.

### Automatic Shut-Off Valves

Automatic shut-off water valves must be provided wherever possible. These valves can be set to cut down the water on lighter plant loads or cut it off entirely if the flow of rock ceases.

These valves can be operated by solenoids actuated in accordance with the motor horsepower being used to operate any certain piece of equipment. If the load increases or decreases at a crusher the horsepower used will vary, causing the solenoid valve to operate. If the crusher runs empty the solenoid valve will shut off completely in accordance to predetermined settings.

Automatic shut-off valves also can be operated by means of a roller tipped lever arm which receives its mo-

(Continued on page 107)

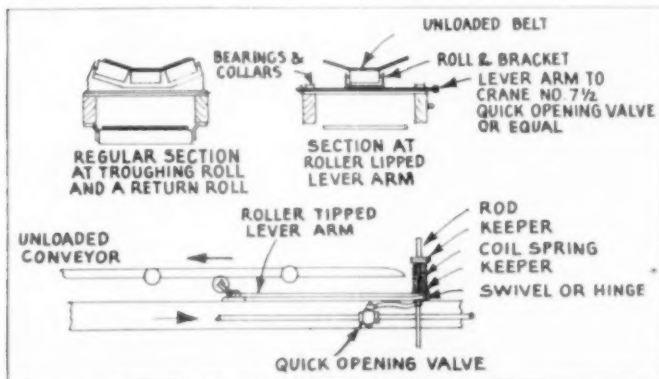


Fig. 1: General arrangement of roller-tipped lever arm for operating quick-acting valve controlling mist, vapor or spray nozzles

## More on Firing Anthracite Coal

Belgian producers have had much experience with low-grade fuels and find controls of utmost importance

By J. A. SLEGTON

AFTER READING the article in the September, 1949, issue of *ROCK PRODUCTS* (p. 70), we began to think that some American cement manufacturers might feel encouraged in their use of mixtures of anthracite coal with bituminous coal to know that the great majority of Belgian plants never burn any mixtures containing more than 14 percent volatile matter.

The author has successfully manufactured over 5,000,000 tons of cement with what is called in Belgium  $\frac{1}{4}$  to  $\frac{1}{2}$  meager coal, (11 to 14 percent volatile). Primary air was about 25 percent at 20 deg. C. (70 to 300 deg. F.). Probably three-quarters of the Belgian cement plants burn coal between 12 and 14 percent volatile, containing from 12 to 25 percent ash and from 2 to 20 percent moisture. Proportions of primary air range from 15 to 35 percent.

Most cement producers in Belgium have long since adapted the lowest possible grades of coal, called dust, principally: fines 0- $\frac{1}{2}$  (from 0 to  $\frac{1}{2}$  mm.) 100 percent passing A.S.T.M. No. 35; fines 0-2 (from 0 to 2 mm.) 100 percent passing A.S.T.M. No. 10; fines 0-5 (from 0 to 5 mm.) 100 percent passing A.S.T.M. No. 4.

Virtually no plant receives larger sizes, except for special purposes such as white cement. Some plants mix up to 50 percent of wet process collector dust containing approximately 13 percent volatile, approximately 23 percent ash and 20 percent moisture.

The influence of low grade coals on the quality of cement and kiln liner life does not have to be considered, as it is possible through careful laboratory tests to overcome difficulties resulting from the use of up to 25 percent ash, and even higher, and compensate for precipitated ash.

This supposes careful blending of coal. For 20 years we stayed within the limits of 1/10 of one percent of calculated  $\text{CaCO}_3$  content. This is easily obtainable but absolutely meaningless if the ash content and ash analysis are not given similar attention. Every shipment of fuel should be analyzed and stored according to ash content in a series of silos, from which table feeders regulate the coal mix within limits of 1 percent or  $\frac{1}{2}$  percent ash.

This mixture has to be put through the drying, conveying and grinding departments so as to be as uniformly mixed as the raw material itself. For an ash content dropping from 20 percent to 10 percent, the Lea Parker saturation of two cements increases about 6 percent. A slurry calculated for highly saturated cement with 20 percent ash coal would result in an unacceptable free lime content and unsound cement if, by mistake, a 15 percent ash coal was fired in the kilns.

It is generally admitted here that the American anthracite is harder to grind, but the Belgian fine coals need from 17 to 20 kw. ton in good installations, for fineness corresponding to 8 percent residue on sieve No. 170. General practice is separate drying followed by grinding in tube mills, but some individual mills give satisfactory service.

Coal has been ground rather finely: with 5 percent residue prior to 1930, the trend then went up to 15 and 18

percent, coming down later to around 10 to 12 percent because frequency in kiln rings due to ash increased. The fusion temperature of coal ash seems to have no influence on clinker ring formation. For this reason we tried coals with fusion temperatures going from 1200 deg. C. (2190 deg. F.) up to 1500 deg. C. (2730 deg. F.) without any change in frequency of ring formation observed on 6 similar kilns.

As for sulfur limit, we had to abandon some coals because of the brown clinker coloration. They contained, respectively:

Ash	Fixed on ash	Volatile	Total
13 percent	0.65 percent	1 percent	1.65
15.25 percent	0.15 percent	3.4 percent	3.55

No difficulties were observed with 1 percent total sulfur.

All those results refer to kilns with separate or planetary coolers, since the Fuller air-quenching type of cooler has only recently been introduced in our country.

There seems to be no doubt that the higher secondary air temperature will increase combustion speed, shorten the burning zone and allow the use of even lower volatility coal.

### Announce Plans for N.L.A. Convention

TENTATIVE PLANS have been announced for the 48th annual convention of the National Lime Association scheduled for May 11-13, 1950 at The Homestead, Hot Springs, Va. As has been the policy for the past few years, the convention is closed to all except National Lime Association members and invited guests.

Speakers will include Dr. E. E. Fleck, Bureau of Entomology and Plant Quarantine, U. S. Department of Agriculture, Washington, D. C., in a discussion of lime in insecticides; H. M. "Hank" Beatty, pension consultant, who will discuss the general pension problem facing the lime industry; T. L. Webb, Union of South Africa, who will report on original research work performed with the differential thermal analyzer; Harry Strain, director of raw material, fuel and power, United States Steel Corp., who will review recent and anticipated changes that have occurred and will

occur in the steel industry; Dr. Firman E. Bear, head of the soils department, New Jersey Agricultural Experiment Station, who will discuss liming programs; Hayse H. Black, chief of the Industrial Wastes Section, Survey & Investigation Branch, U. S. Public Health Service, Cincinnati, Ohio, who will report on federal stream pollution abatement activity as a result of the fairly recent federal pollution law; K. B. Woods, professor of highway engineering, Purdue University, who will report on the results of the current N.L.A. research program on road stabilization; Dr. Willem Rudolfs, head of the department of sanitation, Rutgers University, who will discuss the N.L.A. fellowship in the field of sewage and trade wastes treatment, and Prof. James A. Murray of M.I.T. who will report on the N.L.A. research fellowship.

San Diego firm installs overhead pipe return system to recover wash water; stockpile uses 7-ft. dia. reclaiming tunnel with escape door

By ROBERT F. WELCH



Sand from dry river bottom is loaded to truck for haulage to washer

## SMALL PRODUCER REBUILDS TO IMPROVE AGGREGATE QUALITY

**D**URING the past ten years, Arthur C. Woodward has built up a reputation as a leading sand aggregate producer in the San Diego area. Now, at a time when he could logically think of retirement, he is completing a \$50,000 improvement program which will make his Mission Valley plant a thor-

oughly modern and up-to-date establishment.

"It may seem rather strange for a small concern to be making such a sizable investment when we could undoubtedly remain in business indefinitely with our old set-up," Mr. Woodward comments. "But I want to give

my customers a good, clean graded product never before available here. I feel I owe them the best I'm able to deliver."

Sand is obtained from 46 acres along the dry San Diego river bottom. Formerly it was piled up by Insley dragline, allowed to drain, and was then trucked to the plant for screening before being placed in the loading bunker. Now it is hauled from the pit to a Callahan washer where it is cleaned and graded to A.S.T.M. size specifications before being sold. Allis-Chalmers tractors and McCaffrey loaders are used for stripping.

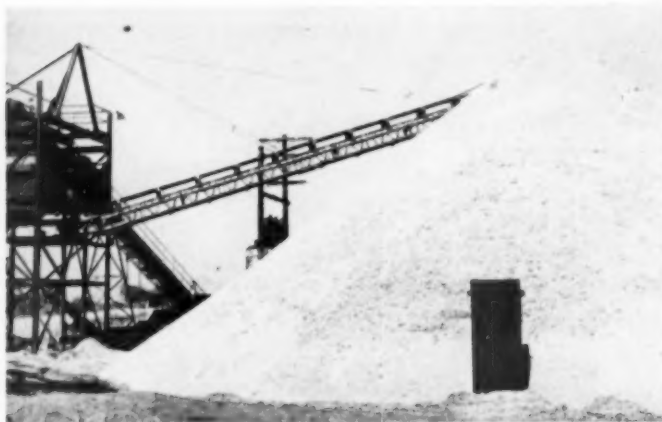
With only one handling necessary where two were required before, the Woodward firm has doubled production without adding to the crew of 13 employees. By operating an 8-hr. shift 800 cu. yd. per day can be produced while 404 cu. yd. was the previous record.

Current level of demand makes it necessary for the plant to run only in the afternoon to replenish each day's shipments. Two men who formerly spent their entire time driving raw material trucks now make deliveries in the morning and switch over to yard work in the afternoon.

At the start of this improvement program, insufficient water for the increased activity was a problem. An overhead pipe return system was installed which enables the same wash water to be used over and over. Pump



Trucks coming from pit, background, unload over grizzly. Material is then transferred to washer by belt conveyor, foreground



From washing and screening station, left, material is conveyed to stockpile. Ten-ft. high metal escape hatch is provided as safety measure in event of a cave-in.

capacity also was increased from 500 g.p.m. to 800 g.p.m. by substituting a 25-hp. motor for a 15-hp. unit.

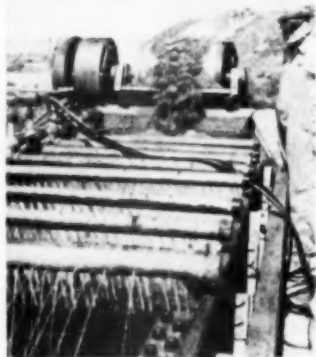
Trucks dump the raw material into an unloading pit from where it is conveyed up to double-deck vibrating screens by a 2-ft., 5-ply endless belt moving at 200 f.p.m.

#### Stockpiling

A stacker carries the sand from the washer at 300 f.p.m. to the 5000 cu. yd. stockpile. Base for this stockpile was prepared with a 6-ft. fill to facilitate drainage. Three underground pipes carry water back to the stream bed.

An especially fabricated 7-ft. corrugated pipe, 140 ft. long, extends under the pile and houses a belt conveyor. It has a 2-in. pitch toward the lower end to facilitate run-off. Opening on to the conveyor are 14 manually-operated sand chutes placed at 45 deg. angles to reduce clogging.

Two features of this installation are unique. Opposite the open end is a



Arthur Woodward inspects vibrating screens which were still undergoing minor alterations at time picture was taken

10-ft. high metal escape hatch. This was provided as a safety measure on the off chance that a cave-in might occur.

In order to keep water off the belt while sand is being carried out to the 148-cu. yd. and 80-cu. yd. loading bunkers, a length of 1-in. angle iron is used as a trough below chutes which are draining. Pins on each side of the chute make it easy to hook the troughs on or remove them when not needed.

Prior to the modernization started in November, 1948, silt in the finished product was running between 1½ percent and 2 percent. Now it is less than ½ of 1 percent. This improvement is particularly valuable to plastering contractors, who make up 90 percent of Mr. Woodward's customers.

Plasterers have many reasons to think kindly of Mr. Woodward, as he often plays host to them. At one occasion, the annual picnic for instance, he spent over \$1000 in giving them a truly memorable outing complete with

a barbecued steer. Both Arthur and John Woodward feel proud of their present facilities. It's not surprising to learn that their customers evidence the same pride and reciprocate with more orders.

#### Shuttle Car Conversion

CERTAIN-TEED PRODUCTS CO., at its Acme, Texas, gypsum mine, is using a shuttle car converted from storage battery to diesel-electric power, bringing it speedier and more economical haulage. This is described in a report issued by the Bureau of Mines. The conversion was decided upon when larger hauls and considerable upgrade work slowed down haulage and exhausted shuttle-car batteries abnormally fast. The conversion was accomplished by installing a diesel-driven generator set in each storage battery compartment in such a way that the generators would operate in parallel and provide constant voltage. Efficiency of the sets was reported as about 95 percent.

Air samples were collected by the Bureau of Mines at the height of the operator's face while the diesels were operating under various typical conditions. Analyses of these samples showed the operator was breathing virtually normal air. However, the report advises giving prime consideration to the possibility that objectionable gases may be present in the exhaust when estimating the amount of ventilation required for the safe use of diesel power underground.

A free copy of Report of Investigations 4643, "Shuttle-Car Conversion from Storage Battery to Diesel-Electric Power, Acme Mine, Certain-teed Products Corp., Acme, Hardeman County, Tex.," may be obtained from the Bureau of Mines, Publications Distribution Section, 4800 Forbes St., Pittsburgh 13, Penn.

#### Promotional Folders Available

AGRICULTURAL LIMESTONE INSTITUTE is making available to member companies a new promotional folder entitled "Limestone, Organic Matter, and Nitrogen." This folder tells the story of the importance of organic matter and nitrogen, and the reason why soils must be limed. Distribution of the folder to farmers should keep them conscious of the importance of liming.

#### High Lime-Fuel Ratio

STRASBURG LIME CO., Strasburg, Va., reports that the fuel ratio with its new Azbe kiln and integral gas producer is 6:1 on the basis of actual lime shipments. Formerly the fuel ratio in small plants handling high calcium lime was seldom better than 3.5:1 and at times as low as 2:1.



Arthur and John Woodward during product demonstration



## EXPANDING PERLITE IN VERTICAL FURNACE

Three grades sized by air separation in Airlite Processing Corp. plant with capacity of six tons per eight hours. Furnace is fired by gas



Charles M. Luedemann, right, and Thomas S. Everitt, president and secretary-treasurer, respectively

**P**ERLITE ORE from Arizona and Nevada is being expanded into a light-weight aggregate or insulation material at a new plant, Airlite Processing Corp., Scottsburg, Ind. This new plant serves the market area of Louisville, Ky., Indianapolis and Evansville, Ind., and Cincinnati, Ohio. Graded perlite ore, received by rail, is expanded in a vertical furnace with an input capacity of 6 tons of ore per 8 hr. Rate and/or amount of expansion depends on three major points, plus additional minor considerations. Major determinants are: (1) type of ore—the several known types of perlite, a natural volcanic glass, vary widely depending on chemical and physical properties of original magma, geologic age in which they were laid down, and distance of deposit from originating volcano as well as subsequent weathering; (2) mesh size of ore as introduced into the kiln; (3) degree and length of period of heat application.

The last two factors are regulated in order to produce a finished product meeting different specifications. Greatest expansion is desired for insulation material, with the expanded product weighing approximately 4 lb. per cu. ft.; concrete aggregate, with the corresponding need for strength, weighs from 8 to 16 lb. per cu. ft.

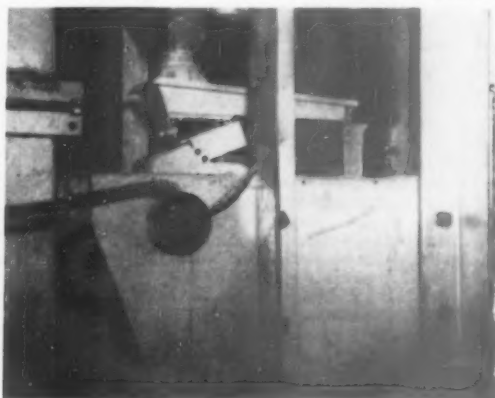
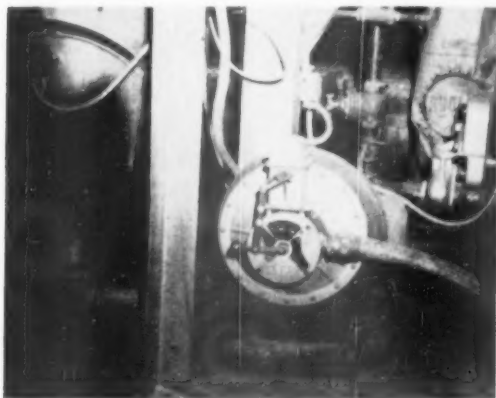
Sized ore is shipped in railroad box cars to the plant, where it is transferred to an overhead bin of 1½-car capacity by a pneumatic unloader. Ore is transferred from storage by gravity to the boot of a bucket elevator on 30-ft. centers for discharge into a ½-cu. yd. hopper as kiln feed. Material is introduced into the vertical furnace at a number of points around its periphery about half-way from bottom to top through 1-in. dia. flexible metal tubes, with a Syntrol electromagnetic feeder governing rate of feed.

Propane gas is employed as fuel,

using a Motor Mix gas burner, with heat being applied usually in excess of 1600 deg. F. Since this plant is new, figures on fuel consumption are as yet incomplete, with present estimates running from 20 to 30 gal. of fuel per 1000 lb. of ore. This ratio will vary widely depending on desired weight (or ratio of expansion) of the finished product.

Gas, mixed with a controlled amount of air under pressure, is introduced through the burner at the hot end or bottom of this Western Products Co. furnace. Thermocouples are located at intervals on the verticle tube, with temperatures being recorded on a control board in front of the unit. This panel also carries valves and switches so that all phases of furnace operation may be controlled by one operator, including rate of material flow over the electromagnetic feeder as well as amount of air and gas entering the expansion unit.

Expanded perlite is blown from the



Left: Valve for mixing propane and compressed air, center, feeding fire pot under vertical furnace. Right: Electromagnetic feeder proportions perlite ore going to expansion furnace



Left: Two cyclone dust collectors on top of expansion unit. Right: Top of elevator that charges vertical furnace with raw perlite

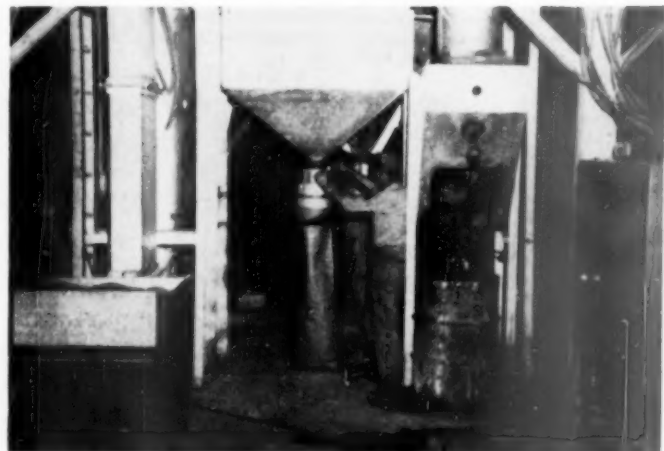
top of the furnace by the draft introduced at the bottom, and upon entering the air-separation chamber above the unit the expanded material is divided into three grades. These three fractions are collected in separate hoppers. A manually-operated gate is located under each of the three collecting hoppers that permits filling of large paper shipping bags. These bags, imprinted with the company trade-mark, have a capacity of 4 cu. ft. of expanded ore. Low-pressure air is introduced into the bottom of each of the three hoppers to aerate the material, creating a more even flow of material. Bulk loading facilities are yet to be installed, but will be of a pneumatic type similar to the bulk-unloading apparatus.

Two cyclone dust collectors, operated in parallel, discharge collected dust to the third hopper that receives the fines from the air separation step. A hydraulic dust collector also is included in the system and a fan exhausts extreme fines to the atmosphere. At the present time no use is made of the discharge from the hydraulic dust collector, but research is being conducted on market prospects for this water-trapped material.

Officers of the corporation are Charles H. Luedemann, president; Fred L. Everitt, vice-president; and Thomas B. Everitt, secretary-treasurer. The last named operates a concrete block and concrete products plant adjacent to the perlite expansion installation and is using Airlite as an aggregate. A modular 8-in. concrete block produced from this aggregate is now under test at Louisville Cement Laboratories, Speed, Ind.

## To Build Granular Materials Plant

H. B. REED & Co., with plants in Hammond, Ind. and Passaic, N. J., maker of granular materials for use in asphalt, contemplates building a \$300,000 plant in Gary, Ind. The company has asked to have the zoning on the area on which it intends to build changed from light to heavy manufacturing. Tentative approval has been given by the Gary plan commission. The plant will not be built for at least a year.



Hopper, bottom left, feeds sized perlite ore to boat of bucket elevator. In the center, bag is being filled with expanded perlite. To right of bagging machine, discharge point of sludge from hydraulic dust collector can be seen. Control panel for entire operation is to extreme right, foreground

## Industrial Minerals Publication

PUBLICATION of "Industrial Minerals" as volume 45, number 4B, of the *Quarterly* of the Colorado School of Mines has been announced by George W. Johnson, acting director of publications at Colorado School of Mines. This is a number of the Seventy-fifth Anniversary Volume entitled "Mineral Resources in World Affairs," which will make available all of the papers presented and much of the discussion at the conferences on the occasion of the 75th anniversary of the school, September 30 and October 1, 1949.

Comprising 44 pages, with 31 illustrations and 9 tables, "Industrial Minerals," number 4B, containing papers delivered at the conference on industrial minerals, includes "Industrial Minerals of Colorado," by George O. Argall, Jr., editor, *Mining World*, San Francisco, Calif.; "The Consumption of Balls in Wet Ball Milling," by C. H. Knight, manager, Canadian division, and Donald Dyrenforth, manager, North American sales, the Dorr Co., New York City; "Ground Water in Nevada," by T. W. Robinson, district engineer, ground-water division, Geological Survey, Carson City, Nev.; and "Searles Lake Development," by B. W. Dyer, district mining supervisor, U. S. Geological Survey, Salt Lake City, Utah.

Bound in heavy-paper covers, "Industrial Minerals" may be obtained from the Department of Publications, Colorado School of Mines, Golden, Colo. The price is 50 cents postpaid in the United States.

**Harry T. Campbell Sons' Corp. adds new crushing plant and black-top operation; company also has ready-mixed concrete, dry batched concrete, sand and gravel, and fine whitening grinding operations**



Texas quarry plant showing inclined conveyor from primary crusher entering secondary crushing station

## Diversification to the "Nth" Degree

**O**PERATIONS OF Harry T. Campbell Sons' Corp., Towson, Md., cover most of the branches of the rock products field, for besides the more well known Texas quarry and plant near Towson, Md., the company has four other quarries, two ready-mixed concrete plants, two Sakrete operations, three black-top plants and a separate plant to grind calcite to micron size. The latter is sold under the trade name of "Camelwite." The newest black top plant is a Cedarapids unit.

The Texas quarry contains what is essentially a dolomitic limestone through which there passes a wide band of high calcium material that has been altered to a crystalline structure and is referred to locally as calcite. The two types of rock are quarried and handled separately, the calcite going to the Camelwite grinding section and the dolomitic stone going for commercial uses. The pit is about 135 ft. deep. A fleet of Mack trucks deliver from it to a recently installed 36- x 60-in. McLanahan & Stone, single-roll primary crusher that is located in the commercial stone plant. This crusher can receive stone up to 4 ft. in size and reduce it to 8 in. or finer. The slugger roll is driven by a 200-hp. motor although only 150 hp. is required. The heavy revolving slugger roll has knobs cast over the surface of the roll and these catch and draw into the crusher practically any stone that is delivered to the unit. The knobs are built up about every two weeks using a soft welding rod on

the manganese followed by a hard metal rod. The crusher was installed during May of 1949 and is a smoothly operating piece of machinery. Installation of the slugger crusher not only has increased plant capacity materially but has saved considerable secondary drilling, blasting, etc.

The company recently added two new Mack trucks to which it supplied steel bodies of its own manufacture. These are rear dump units of extra rugged construction. The company also added recently a new 2½-cu. yd. Northwest diesel shovel in the pit.



Primary crushing station. Fly wheel of new 36- x 60-in. roll crusher shows through door

The crushed rock from the new slugger roll primary crusher is received by a 36-in. Stephens-Adamson inclined belt conveyor which delivers it to the older sizing plant. This belt is 200 ft., center to center, of 5-ply construction and was supplied by the Quaker Rubber Corp. The commercial stone plant features a 5- x 12-ft. dry double-deck W. S. Tyler scalper. The minus 1-in. from the lower deck can be by-passed to a steel silo and disposed of if the material contains too much quarry dirt. For secondary crushing a 25-B Tel-smith gyratory is used. It is fed by a heavy duty Syntro vibrating feeder. Trucks can dump direct to this crusher if desired, and rock from this source is fed to the crusher via a Ross chain feeder. Two Kubit crushers are operated in the final crushing section of the plant. These are said to keep the problem of flat and elongated particles in a very subordinate position in the grading of the final output. The stone from this section of the plant is elevated via bucket elevator to the washing section of the older plant. A second smaller McLanahan & Stone single roll crusher is used in the calcite plant.

Bruce S. Campbell is president of Harry T. Campbell Sons' Corp. E. F. Reichert is quarry and crushed stone superintendent and Richard L. Campbell is plant engineer. James J. Harrison is technical director for the company, in charge of the Camelwite plant, and is quite active as a sales engineer in merchandising this material.

# Aggregates



Left: Waste dump for iron mines now being processed for commercial stone. Right: Overall view of plant. Primary crusher shed is in foreground with truck dumping to pan feeder serving it

## Aggregates from Mine Waste

**Pennsylvania Aggregates, Inc., processes tailings from worked out iron mine into aggregates suitable for Pennsylvania Turnpike extension**

THE IRON MINES being operated by Bethlehem Steel Co., Cornwall, Penn., are said to have started producing iron ore exactly fifty years before the American Revolution (1726). During the next 200 years or more of activity, the Cornwall mines accumulated literally millions of tons of strippings and waste rock, but it was not until 1948 that it was recognized that here, already quarried and easily available, was a rock that would make suitable commercial aggregate. Possibly the extension of the Pennsylvania Turnpike eastward from Carlisle to King of Prussia, a small settlement a short distance from Norristown, Penn., added importance to the material, for a large percentage of the Turnpike's requirements has been supplied from

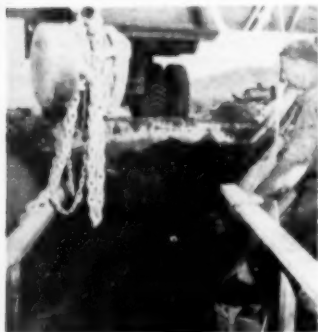
By **WALTER B. LENHART**

the new plant built there by Pennsylvania Aggregates, Inc.

The material being processed at the new plant of Pennsylvania Aggregates, Inc., is a limestone intermixed with some ferruginous materials, some of which are magnetic. Like most mine waste dumps, this was the burying ground for other waste products from a large mining operation: old railroad ties, scrap iron of various kinds, etc. As a result, in the processing plant some sorting and belt-picking is practiced so as to keep this type of material out of the final product and to protect the crushing equipment from scrap iron inclusions.

The dump being processed by Pennsylvania Aggregates, Inc., has been spread out over a large area in a rather flat bed about 20 to 180 ft. thick. The oversize in the pile is not too great and the set-up lends itself in an ideal manner to the use of a drop ball for secondary breakage. A 2½-ton drop ball made from a piece of old shafting and using a two-chain sling is employed. One chain passes around a used truck tire and the other connects the same tire to the crosspin of the drop ball. A swivel is used at the cable end. The rubber tire takes up a considerable amount of the shock incidental to the operation, but has the disadvantage that the tires do not last very long. The life of these vary from two days upwards. An Osgood crane with a 50-ft. boom is used successfully on the drop ball work.

The plant is a neatly laid out, straight-in-line operation using belt conveyors throughout. These were supplied by Barber-Greene Co. The plant was designed cooperatively by the company and A. R. Amos, Jr., Philadelphia representative for Smith Engineering Co. It features the use of diesel engines for all the power units in the plant. The smaller pieces of equipment are motor-driven with the power supplied by a 187 kv.a. Electric Machinery Co., a.c. generator powered by a G. M. diesel. A Buda diesel engine is V-belted to the 30- x 42-in. Telsmith primary jaw crusher. A set of Hercules chain blocks are mounted over the primary crusher. A second G. M. diesel drives, through a multiple drive involving a jack-shaft and V-belts, the two secondary crushers



Pan feeder serves 30- x 42-in. primary jaw crusher



Picking off tramp iron after second crushing

which are a 10- x 36-in. Telsmith jaw and a 13-B gyratory. The final reduction crusher is a 36-in. Gyrasphere driven by a Murphy diesel. The plant has a capacity of 300 t.p.h.

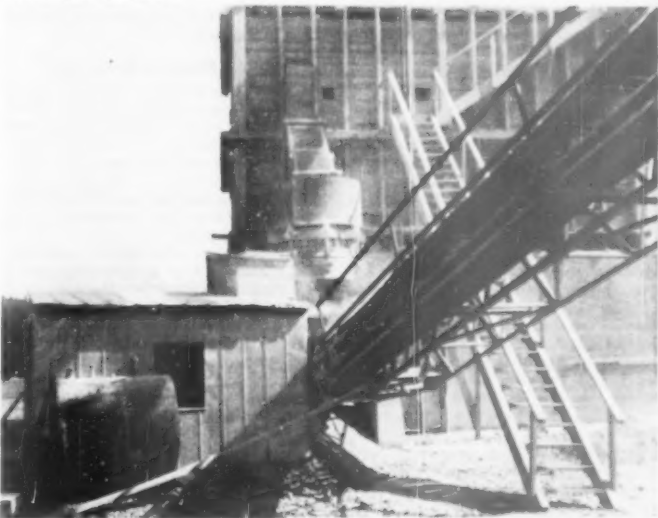
Loading at the spoils bank is done by a 2-cu. yd. Lorain model L-820 shovel which supplies a fleet of Euclid rear-dump trucks. These unload via a ramp at the primary crusher to a Telsmith pan feeder. A second Lorain 75-B shovel is used for reclaiming from the stockpiles. The latter shovel is augmented by a Unit shovel, crawler-tread mounted. All aggregates from the plant are hauled by truck and are weighed at the plant office on a pair of 30-ton capacity Howe truck scales.

### Screening

There are three vibrating screens involved in this new plant. The first in the processing order is a 5- x 12-ft., two-deck Vibro-King that has a top deck of 3½-in. wire. The lower deck has 1½-in. wire on the upper half and 1½-in. wire on the lower. The material through the top half of the lower deck goes out as Pennsylvania 2-A. The material through the lower half of this same deck is classed as 2-B. The oversize from the top decks is chuted to the 13-B gyratory crusher and that from the top of the lower deck goes to the 10- x 36-in. jaw crusher, or can go as No. 4. Both these crushers unload to a 30-in. Barber-Greene belt conveyor that serves the second vibrating screen. This latter unit is a 5- x 12-ft. Pulsator with a top deck of 2½-in. wire, a middle deck of 1½ in. and a lower deck with three sizes of screen on it: top, ¾ in.; middle, ½ in.; lower, ¼ in. Oversize from the top decks is spouted to the final reduction Gyrasphere crusher which unloads to a 24-in. return belt that serves the first mentioned 30-in. belt. The material from the middle deck also can be chuted to the 36-in. crusher or can be classified as No. 3. The materials through the lower deck are dust, ½ in. and Pennsylvania No. 2, or ¾ in., respectively. These materials fall into wood bins that are supported on concrete masonry walls. All screening is done dry and the screens and primary crusher building are enclosed in corrugated iron structures. The other major units, crushers, etc., are not enclosed. The diesels are all in small separate sheds.

Pennsylvania Aggregates, Inc., has its home office at Talmage, Penn., and is owned by D. M. Stoltzfus & Son, Inc., which operate quarries at Talmage and Quarryville. Cleon Kahler is general superintendent for Pennsylvania Aggregates, Inc.

Top: Two-cu. yd. shovel loads waste rock from mining operations to rear dump unit. Center: The 36-in. crusher can be seen in background. Shed houses diesel that drives this unit. Bottom: Crane reclaims stone from stockpile. Secondary crushing station can be seen in background.





## Lightweight Aggregate From Phosphate Slimes

Commercial uses developed in Florida for finely divided phosphatic clay, wasted during mining and processing of pebble phosphate

**T**HE DEMAND for concrete aggregate in Florida is large since concrete and concrete products are among the most widely used construction materials. Aggregates, except possibly limerock in some sections, are difficult to obtain in Florida and few Florida industries produce a slag or clinker waste product suitable for aggregate use.

With the increasing demand for concrete aggregate, the need for a lightweight material has also developed. Characteristics imparted in varying degrees to concrete, using lightweight aggregates, are lightness in weight, "nailability," ease of cutting and channeling, and heat-and-sound insulation qualities. Lightweight aggregates have found use in the construction of large buildings where the reduction of dead weight, particularly in roofs, is essential. In the manufacture of precast building units such as blocks, concrete joists, floor and roof slabs, the use of lightweight aggregates has been particularly advantageous because of its "nailability" and lightness. These aggregates have also been used in many concrete structures which require sound- and fireproofing properties.

### Raw Material Requirements

Many clays and shales, when processed, develop the necessary characteristics of a lightweight aggregate. They must meet certain basic requirements in order to develop these characteristics, namely:

1. The material must develop a glassy phase at a reasonably low temperature in order to entrap evolving gases.
2. Gas-forming constituents must be present.
3. The gases must be released at an optimum rate, and at the temperature and time coinciding with the optimum pyroplastic condition of the clay.
4. Under these conditions the material must have a viscosity which fosters the formation of bubbles of a size and wall thickness which will produce maximum strength of the aggregate.
5. The material must bloat at a

By R. C. SPECHT and  
W. E. HERRON, JR.\*

reasonably low temperature for economic reasons.

### Clay Heating Reactions

A wet clay will pass through several reaction stages upon heating. Most of the reaction stages overlap each other, but the approximate order during the temperature rise is as follows:

1. Mechanical moisture dehydration period (removal of shrinkage water and pore water).
2. Chemical or molecular water-dehydration period (removal of water in chemical combination).
3. Hygroscopic or colloidal water dehydration period.
4. Oxidation period (iron, sulfur and carbon).
5. Dissociation-reduction period (calcium and magnesium carbonates and sulfates, ferric to ferrous oxide).
6. Vitrification period (first glass formation).
7. Pyroplastic condition (bloating period).
8. Melting period (loss of structure and shape).

### Description of Deposits

The phosphate industry in Florida discharges finely divided phosphatic clay, called "slimes," during the mining and processing of pebble phosphate for the market. Because of the large tonnage of this clay produced annually, possible commercial uses are being sought and an investigation of its suitability for the production of lightweight aggregate was undertaken by the Engineering and Industrial Experiment Station of the University of Florida. The ore when mined is embedded in a matrix of clay and sand, which is removed by washing and screening at the washer plants. The slimes, resulting from the disintegration of clay, are discharged as suspensions in water into large ponds for settling.

The settling of the slimes presents a difficult problem because of their colloidal nature. Large areas, covering several hundred acres at each plant,

are required in order to provide sufficient time for settling. Eventually these ponds become completely filled and new settling areas must be provided. The total amount of slimes, discharged to settling areas as waste during 1947, is estimated to be 6,000,000 tons, or approximately the same tonnage as the phosphate ore recovered.

The maximum particle size of the slimes is less than 150 mesh, with most of the material in the semi-colloidal and colloidal range. When the water content of the slimes is reduced to 35 to 50 percent, they are extremely plastic and can be extruded or molded. Upon drying they shrink and crack in a manner characteristic of other colloidal clays. Air-dried lumps will disintegrate again when placed in water. The color of the slimes varies from light gray to orange to reddish brown.

Following is a typical chemical analysis of a dried phosphate slime:

	Percent
P <sub>2</sub> O <sub>5</sub> .....	12.88
CaO .....	16.03
Fe <sub>2</sub> O <sub>3</sub> .....	2.99
Al <sub>2</sub> O <sub>3</sub> .....	9.12
Insoluble (largely SiO <sub>2</sub> ) .....	49.40

A typical particle size distribution is as follows:

	Percent
Plus 200-mesh .....	22.10
Minus 200-mesh .....	77.90

The approximate mineral composition of the slimes reported by one of the phosphate mining companies is as follows:

	Percent
Quartz .....	46
Apatite .....	30
Clay .....	20
Feldspar .....	4

### Blooming Tests

Five slime samples from five different phosphate mining operations in Polk county, Florida, were collected for test purposes. The slimes were prepared for blooming tests by dewatering until workable, extruded into 1/4-in. cylinders, and cut into short lengths to form pellets. The pellets were dried at 110 deg. C. in a cabinet dryer. Samples of approximately 25 grams each were fired in an electric muffle furnace at various temperatures and

\*University of Florida, Gainesville.

times. The temperature range was designed to cover the entire bloating period from incipient expansion to fusion. In addition to the runs at constant temperature, the effect of slow heating and slow cooling were investigated.

The results of the firing tests indicated that the best bloating temperatures were between 2000 deg. F. and 2200 deg. F., depending upon the origin of the sample. Approximately 10 minutes of firing were required. Samples heated slowly did not bloat, thus indicating that rapid firing is an essential factor in the bloating process. Slow cooling of rapid-fired samples produced little effect on the lightweight characteristics of the product.

A summary of the best bloating results obtained in the investigation is given below. For comparison, a phosphate slime aggregate sample produced by the Bureau of Standards (No. 6) and a sample of gravel are shown.

Sample No.	Time min.	Temp. deg. F.	Bulk Wt. lb./cu. ft.	Absorption percent
1	10	2000	37.8	20.2
2	5	2200	61.0	11.1
3	10	2000	54.6	9.4
4	10	2000	34.6	6.7
5	10	2000	37.5	15.5
6	—	—	53.1	19.4
Gravel	—	—	100-120	—

Analyses of the gases evolved at bloating temperatures were made for three samples. The dry pellets were placed in a Vycor combustion tube and fired in a combustion tube furnace. A slow moving current of nitrogen swept the evolved gases from the combustion tube into a gas absorption chain. The absorption chain was composed of three gas absorbers—a water absorption unit, a sulfurous gas (sulfur dioxide and hydrogen sulfide) unit, and a carbon dioxide absorption unit. Analyses of the gases obtained are shown here.

Sample No.	Percent H <sub>2</sub> O	Percent SO <sub>2</sub> & H <sub>2</sub> S	Percent CO <sub>2</sub>	Percent Total
1	7.2	0.4	2.0	9.6
4	6.6	0.3	2.0	8.9
5	7.4	0.0	2.5	9.9

Ignition losses of these samples checked closely with the absorption results, thus indicating that no appreciable amount of other gases was evolved. A test to determine the effect water has on bloating was made by drying a sample of pellets at 1000 deg. F. to constant weight, and then firing at the bloating temperature. A bloated product was obtained with weight properties similar to those previously determined. Since practically all water, both mechanical and combined, is removed from clays by firing to 1000 deg. F., this test indicates that the chemically combined water has little effect on the resultant bloating characteristics of the product.

#### Mechanical Drying

Removal of the mechanical moisture from the slimes is the most difficult and expensive step in the process of

commercially producing lightweight aggregate from slimes. The slimes may be thickened to approximately 20 percent solids by methods of sedimentation. To reduce the water content from this point to a plasticity suitable for extruding (approximately 50 percent solids), four methods were considered, namely, vacuum filtration, pressure filtration, centrifuging, and drying. Laboratory investigations, however, indicated that vacuum filtration and centrifuging were not applicable for dewatering the slimes.

To test the applicability of pressure filtration, a 6½-in. dia. laboratory plate-and-frame filter press with center feed was used. The slimes were forced from a 3-qt. capacity tank into a single frame, 1-cm. thick, by compressed air, automatically governed by a pressure regulator. The quantity of filtrate obtained at definite intervals of time was measured and recorded.

Filtration tests were made on each of the 5 slime samples at constant pressures, varying from 40 p.s.i. to 100 p.s.i.

The type of filter press commonly used in the kaolin industry is a 30-in. square recessed plate press with 72 chambers. When dewatering kaolin, approximately one hour is required for cleaning type of press.

If a rotary dryer is used, the amount of fuel oil necessary to reduce the water content of the slimes from 80 percent to 45 percent is estimated to be 0.28 lb. oil per lb. solids. Cost analyses of dewatering to 55 percent solids indicate that filtration would

be more economical than drying, the filtration cost being estimated at \$5.50 and the drying cost approximately \$9.50 per ton of aggregate produced. The filtration cost represented 44 percent of the total estimated cost for commercial production.

#### Removal of Water

After extruding and pelleting the plastic slimes, the remaining mechanical and hygroscopic water must be removed by drying. Tests were made to determine the time required to dry ¼-in. diameter plastic pellets at various temperatures.

In order to dry the plastic pellets in a rotary dryer, an estimated gas temperature of 1200 to 1800 deg. F. is necessary to dry the surface rapidly so as to prevent the pellets from sticking together. The waste stack gases from the kiln may be utilized for the drying. To prevent the pellets from sticking during firing they may be coated with a mixture of portland cement and fine silica.

A study of cost estimates based on the laboratory investigation indicates that while phosphate slimes will produce excellent lightweight aggregates they cannot compete commercially with available clay deposits which will produce a product of equal quality and weight. This situation may be altered when some of the settling ponds become filled and are abandoned, and the sedimented material allowed to dry. A pilot plant test should be made if more accurate cost data are required.

### Pozzolanic Activity and Insoluble Residue

ABSTRACTED BY F. O. ANDEREGG

The subject of pozzolanic material keeps appearing in the European scientific literature every little while, indicating the subject to be one of great interest. Prof. Luigi Santarelli has published results, appearing from June to October, 1948, in *L'Industria italiana del cemento* on this subject. The point of greatest interest is in the good correlation he has found between pozzolanic activity, as measured by mixing with 20 percent of hydrated lime, and the residue insoluble in HCl and KOH, according to the 1939 specifications of the Italian National Research Council. The HCl of sp. gr. 1.12 is evaporated to dryness and then 25 percent KOH is added. It is allowed to stand overnight and then boiled for four hours.

The pozzolanic cement resists leaching much better than straight portland cement. From a mixture of 60 portland clinker and 40 pozzolanic material, distilled water leached lime in 90 days to the extent of 800 mg. per liter. Straight cement was leached to the extent of 180 mg. per liter in a like time. On replacing with fresh

water in an additional 50 days, the concentration of lime reached 350 mg. per liter from standard portland cement and about 40 mg. from the mixture.

The resistance to chemically aggressive solutions is often greatly enhanced by the addition of pozzolanic material. It is true that shrinkage is also increased, but the heat of hydration is appreciably lowered.

#### Liming Experiments

A RECENT RELEASE from the New Jersey Agricultural Experiment Station contains a report and charts covering work of the National Lime Association Fellowship, written by David Ririe. The report concerns the results from analyses that have been completed on leachates 6 through 10. It also deals with the cumulative average outgo of Ca, K, Na, Mg, and N; and the changes in pH are reported and discussed for the same leachates. Leachings in this experiment represent a total application of water equivalent to 40 in. of rainfall for New Jersey. The report includes 11 tables of analytical matter.

# Agstone



One of the 5-cu. yd. hydraulic end-dump quarry trucks being loaded by 2 1/2-cu. yd. shovel

Primary and secondary reduction of quarry-run material for agricultural limestone are accomplished by single double-impeller at Falk quarry. Company has fleet of spreader trucks

By DAVID MOCINE

## A Single Crusher Limestone Plant

**P**RODUCTION OF AGRICULTURAL limestone in northeastern Iowa requires utmost flexibility of plant design. By this we mean not only use of portable crushing and screening equipment, but also specialized permanent plants to meet peculiar local conditions. One operator will have more than 30 quarries available in a county, which he works with portable equipment, yet in the neighboring county one operator has permanent plants at two quarries, where the deposits are the only source of stone suitable for the production of agricultural limestone and roadstone in this area.

L. R. Falk, St. Ansgar, Iowa, is in the latter category, as his total crushed stone production is confined to two permanent plants. The newer of these, about 3 miles north of St. Ansgar, is located on a 17-acre tract owned by the operator. This deposit is of dolomitic limestone. Mr. Falk

was forced to advertise extensively in local papers to overcome the farmers' prejudice to anything but pure white limestone (see *ROCK PRODUCTS*, April, 1949, p. 124, for article concerning similar problem as overcome by Dillon & Sharpe Co., Columbus Junction, Iowa).

### Crusher Installation

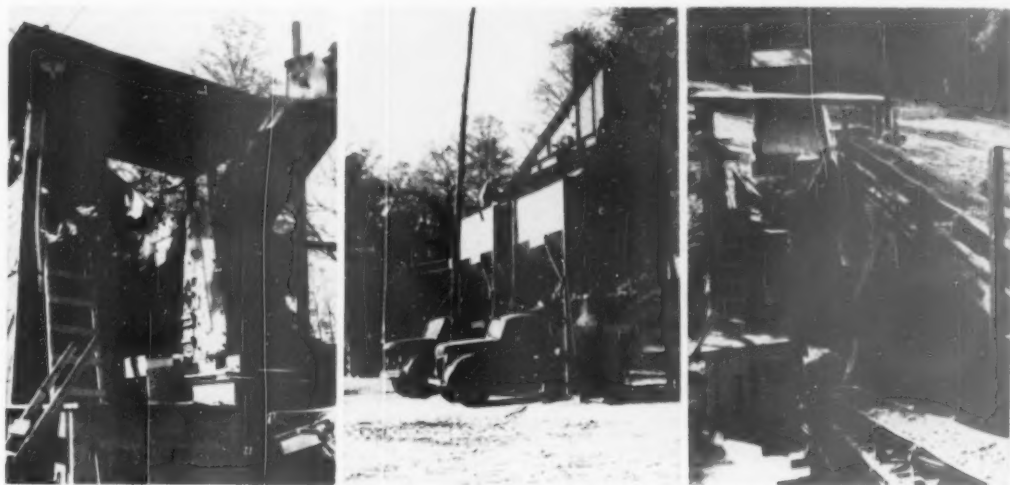
At this deposit the upper stratum of stone is partially fragmented, while the bottom stratum, about 25 ft. in depth, is solid. One crusher, a New Holland 30- x 30-in. double impeller breaker, accomplishes both primary and secondary reduction of quarry-run stone handled by a 3/4 cu. yd. power shovel bucket. This crusher is driven at 920 r.p.m. by two 60-hp. General Electric fully-enclosed, fan-cooled electric motors, each V-belt connected to one of the two impellers. The management has found that by operating the

crusher at this speed, production is approximately half roadstone (minus 3/4-in.), and half agricultural limestone (minus 5/32-in.). A slower r.p.m. rate yields a higher percentage of roadstone. Production of these two sizes of stone is at a rate of approximately 90 t.p.h.

The rockledge, where production has been carried on for about two years, slopes slightly toward the Cedar River which borders one side of the site. Approximately 6 in. of overburden is stripped with a 3/4-cu. yd. Lima shovel powered by a Buda gasoline engine. Strippings are hauled to waste in dump trucks. The rockledge is followed by one to two feet of clay which is wasted by dump trucks. Below the clay seam there is 30 ft. of solid rock, some of which lies below the water table. Present floor of the quarry is on a level with the bottom of the river and recovery of stone



Left: Bulldozer on top of agstone stockpile. Right: Front-end loader of 3/4-cu. yd. capacity loading stone from stockpile at Osage quarry



Left: Quarry truck dumping to crusher hopper; belt conveyor, visible at bottom right, carries crusher discharge, and belt at upper right returns oversize from screen. Center: Two-deck screen powered by 10-hp. fully enclosed fan-cooled motor; screens are  $\frac{1}{4}$ -in. mesh on top deck and 5 32- x  $\frac{1}{2}$ -in. slotted mesh on bottom deck. Right: View of crusher discharge belt, bottom, and oversize return belt at top; approximately 15 percent of main load is returned for recrushing

below this level might be considered at some future date if it is deemed economically advisable.

#### Blasting and Hauling Methods

Although company management contracts blast hole drilling at this quarry, purchase of a well drill is contemplated in the near future. Six-in. blast holes are drilled to a 30-ft. depth, staggered, in two rows. About 20 holes are shot per blast with 12-ft. burden and 15-ft. spacing, using du Pont Nitramon powder and Primacord, with delay action caps. The same shovel that is used in overburden removal loads two 5-cu. yd. hydraulic end-dump quarry trucks fitted with St. Paul bodies mounted on K-10 International chassis. These trucks negotiate a 5 percent grade on a 1000 ft. haul to the plant, where they dump to a feed hopper at the primary crusher. A pan feeder powered by a 7½-hp. motor delivers stone to the crusher.

#### Screening Set-up

Discharge from the crusher is collected on a 24-in. Pioneer belt conveyor on 70-ft. centers, powered by a 10-hp. motor, which delivers material to a 4- x 12-ft. triple-deck New Holland vibrating screen. At present only two decks are in use on this screen, with  $\frac{1}{4}$ -in. mesh on the top deck and 5/32- x  $\frac{1}{2}$ -in. slotted mesh on the bottom deck. This screen is powered by a 15-hp. motor and has two large chains playing on the bottom deck to prevent blinding of the damp stone. The screen is mounted over two truck hoppers with oversize from the second deck being chuted to one bin and throughs from the bottom deck falling

to a second bin. Oversize on the top deck is returned to the crusher by a 24-in. belt conveyor on 60-ft. centers, powered by a 5-hp. motor. Approximately 15 percent of the load on the first belt is returned to the crusher by the second belt conveyor.

Both agricultural limestone and roadstone are loaded out from these 21-cu. yd. capacity hoppers with surplus being trucked to ground storage. A  $\frac{1}{4}$ -cu. yd. Lull front-end loader, mounted on a Minneapolis-Moline rubber-tired tractor, is used for loading from stockpile. A 20-ton Bonded truck scale is available for weighing all outgoing shipments. A dozer mounted on a Caterpillar D-7 diesel tractor is used for stockpile clean-up work and general utility jobs around the plant and quarry.

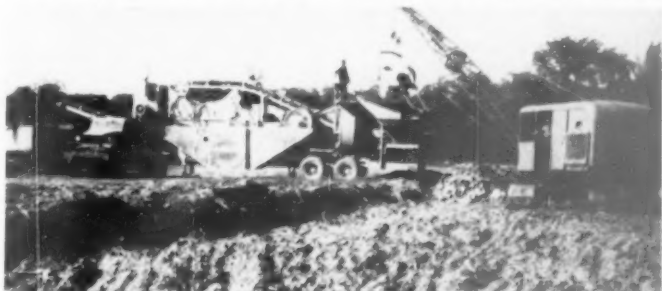
#### Spreader Trucks

Six dump trucks are used at this

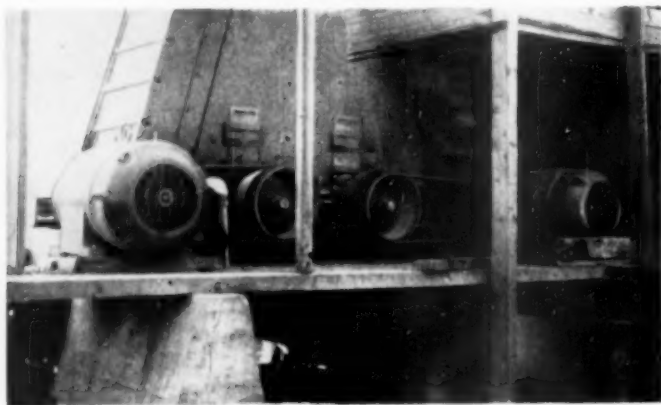
operation and 10 agricultural limestone spreader trucks operate from the plant. Agstone spreader trucks, all with New Leader spreader bodies mounted on Ford, Chevrolet and Dodge chassis, are owned by the company. The management believes that by owning the fleet of spreader trucks, a better price may be made to the farmers and still maintain an adequate return to the overall company operation and investment.

#### Second Quarry

The second quarry, south and west of the town of Osage, is about 18 miles distant from the first quarry and has a rated capacity of 65 t.p.h. This plant also produces both roadstone and agricultural limestone. Primary reduction is accomplished by a jaw crusher, with secondary reduction by two hammermills operating in parallel. Three Caterpillar D-12000 die-



Bottom-dump road stone spreader truck, left, receiving sized gravel from portable crushing and screening plant; 1-cu. yd. dragline, right, loads pit-run material to plant or costs overburden into worked out section of pit



Both primary and secondary reduction of quarry-run material is accomplished by this double impeller crusher, driven by individual 60 hp. motors

sel engines provide all power for this plant. Power shovel and quarry trucks are transferred to either quarry as needed.

#### Portable Plant

Mr. Falk started aggregates in 1929 with a small portable sand and gravel crushing and screening plant which was mounted on steel tires. The company operates what is reported to be the only deposit of "hard" gravel in the county. This pit is located two miles due west of Osage and available land, company owned, covers approximately 100 acres with an average deposit of 25 ft. A new Cedarapids portable junior tandem sand and gravel plant is now in operation at this pit. Gravel from this operation is used in a ready-mixed concrete plant in Osage, which Mr. Falk owns in partnership with L. H. Decklever.

A Lorain 1-cu. yd. dragline, powered by a 318 Caterpillar diesel engine, strips overburden and casts it back into the worked-out gravel pit. This same dragline loads pit-run material directly to a 2-cu. yd. hopper that is an integral part of the plant. Screen mesh on the 3- x 10-ft. double-deck vibrating screen is 1 1/2- and 3/4-in., respectively. Primary reduction is accomplished by a 10- x 36-in. jaw crusher, set for 2-in. discharge. Secondary reduction is by a 24- x 16-in. roll crusher set for 3/4-in. discharge. Material passing the crushers is returned to the screen in a closed circuit. Throughs from the screen fall into a 3-cu. yd. hopper, which feeds a 24-in. belt conveyor on 24-ft. centers that serves as a truck loading belt at one end of the unit. This plant is powered with a D-8800 Caterpillar diesel engine through V-belts.

A high percentage of production from the portable plant is used for county road maintenance in this rural area. In order to serve these road jobs throughout the county the port-

able crushing plant is moved to as many as 17 locations in a 7-month operating year.

Main office of the company is located in the town of St. Ansgar, as is a company shop and warehouse for truck and machinery maintenance. A



L. R. Falk, plant owner, right, with Bob Coonradt, plant foreman, left, and R. A. Anderson, office manager, center

mechanic is employed full time at this shop with responsibility for the equipment at all three operations. In the winter months when the quarries and pits are forced to close due to cold weather, all equipment is brought to the central shop and four mechanics are employed in regular maintenance and repair work.

#### N.I.S.A. Convention

THE NATIONAL INDUSTRIAL SAND ASSOCIATION, Washington, D. C., will hold its 15th Annual Convention at The Homestead, Hot Springs, Va., May 17-19, 1950. Proceedings will

start with the handling of official association business, including presentation of a financial report and the report of the Committee on Nominations.

There will be an open forum discussion on problems of packaging ground sand, and a discussion of general questions relating to foundry sand. Stanton Walker, consulting engineer, will lead discussions on engineering matters.

Chairman of the Traffic Committee, Emery M. Durstine, will report on the activities of his committee, and Mr. Collin, commerce counsel, will report on the outcome of the bonded sand complaint, Docket No. 30377. Mr. Durstine and Mr. Collin also will discuss the status of the general complaint on sand in closed cars, Docket 30524.

On the second day, Mr. Waters, counsel for the association, will report on recent developments in workmen's compensation insurance, legislation affecting the industrial sand industry, and the status of negotiations with the National Council on Compensation Insurance, which have already resulted in reducing silicosis compensation rates.

Another speaker at the session will be Fred W. Braun, vice-president and chief engineer, Employers Mutual Liability Insurance Co. of Wisconsin, who will talk about all phases of the occupational disease problem. On May 19, the featured speaker will be George C. Smith, economist, U. S. Chamber of Commerce, who will discuss "Business and the Welfare State." Mr. Smith, among other things, will touch on the question of demands from unions for pension and welfare funds. A discussion of the results of the test run in New Jersey on exchange of information with respect to delinquent accounts will follow. The board decided at the last meeting to conduct an experiment in New Jersey to determine whether a program of this kind was feasible. New Jersey members cooperated in the launching of monthly reports on delinquent accounts, and the first report has just been sent to New Jersey members. Clarence Wolf has been asked to report at Hot Springs regarding the activity. By that time three monthly reports will be in.

There will be a general discussion of current industry problems, including the status of collective bargaining negotiations and prospects for the rest of the year.

Entertainment arrangements include a nightly bingo party, with Emery Durstine as master of ceremonies, the annual women's tea, and golf with prizes for both men and women.

#### Gravel Firm Opens

WILSON-McLAUGHLIN SAND AND GRAVEL CO. has opened a plant on an 80-acre tract near Sandusky, Ohio. It represents an investment of \$50,000.



## Limestone Mine

(Continued from page 74)

structure that trucks from the yard enter, a 3- x 4-ft. board has been mounted that carries numbered lights, each corresponding to a particular bin. When the operator in the plant sees a bin filling up, he lights the corresponding number on the board and there is no time lost by truckers in trying to attract his attention or make themselves heard above the noise of the plant.

A new weigh house is being constructed of concrete block at the entrance to company property that will have a platform-type truck scale on two sides. One is a 50-ton capacity Fairbanks Morse with a 45-ft. platform and the other is a 49-ton Winslow with a 34-ft. platform. Both are dial scales. As high as 3750 tons of crushed rock have been delivered from this plant in one day. All material leaving the plant is weighed, with weigh tickets being made in triplicate, the third copy remaining in the ticket-writing machine to form a permanent record of the day's business.

The company operates a concrete block plant and ready-mixed concrete plant one mile distant from the plant. For pictures and story of this operation, see *ROCK PRODUCTS*, December, 1948, p. 194.

Ralph Rodgers is president of Ralph Rodgers Co., the parent organization; G. C. Brunnhofer is general manager of Louisville Crushed Stone Co.; Ora G. Brown is general superintendent of the plant and mine, and Arnold Burke is truck foreman in charge of delivery.

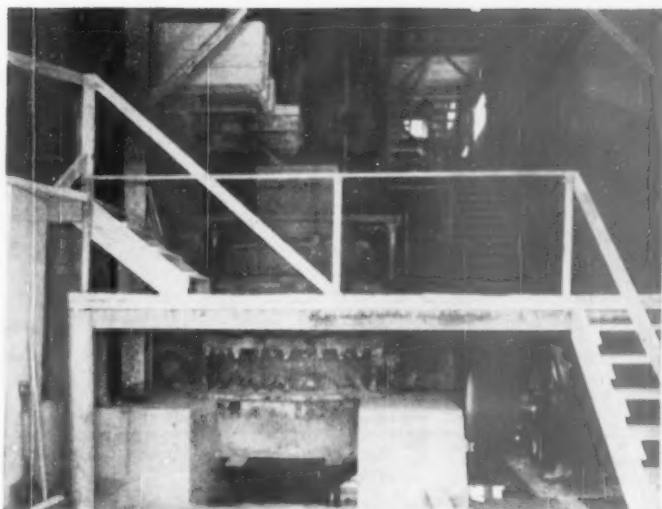
## Materials Handling Exposition

THE FOURTH National Materials Handling Exposition will be held in the International Amphitheatre, Chicago, Ill., April 30 to May 4, 1951. Concurrently with the show, a conference will be conducted with nationally-known experts leading the discussions on new techniques in materials handling and related fields.

Outstanding among the innovations of the next show will be 4 acres of outdoor area to permit demonstrations of actual use of yard handling equipment. Smaller machines will have 6 acres of space for operation indoors. Several hundred manufacturers of materials handling equipment with thousands of models will provide an extensive display of machinery in operation.

## Limestone Plant Opened

WHITE RIVER LIMESTONE PRODUCTS Co., Penter's Bluff, Ark., will begin operation of its \$300,000 plant early this summer. Howard Miller of Little Rock is president of the company. The plant, which will employ approximately 40 persons, will have a production capacity of 2000 t.p.d.



Crushing and screening section, Louisville Crushed Stone Co., showing 3-ft. gyratory crusher, foreground, with bucket elevator, background, taking crusher discharge plus throughs from screen to 4-deck screen at top of plant

## U. S. Steel Corporation's Pension System—A Correction

Dear Mr. Rockwood: A. W. Worthington, president of Pittsburgh Limestone Corp., has referred to me the February, 1950, issue of *ROCK PRODUCTS* which contains your excellent article on the United States Steel Corporation's Pension and Insurance Plan.

Since your magazine is a most important publication in the industry and is so widely read, in order that others may not gain a mistaken impression of the new U. S. Steel Pension Plan, we wish to call to your attention a misinterpretation of the meaning of one provision of the Pension Agreement, relating to adjustment for Social Security pension. We would like to explain the relationship of the Steel pension to Social Security pension, or "Public Pension."

From the statement appearing in the last paragraph at the bottom of page 77, we note that you have gained the impression that only one-half of the Social Security pension is deductible from the company pension provided by the Agreement. Paragraph 2, Section II, of Part II of the November 11, 1949 Agreement, is a rather long and involved paragraph and apparently may be misconstrued by those not familiar with the intent of the parties. It seeks, however, to draw a distinction between "Public Pension" and "Other Pension." With respect to "Public Pension" (and Social Security pensions fall within the definition of Public Pension as indicated in the first part of paragraph 2) there is a full deduction of the amount of the Social Security pension; it is even provided that deduction shall be made of the amount of Social Security pension to which an employee would be

entitled but is not receiving, in that he has not made application for it or has otherwise disqualified himself to receive it, by engaging in work for compensation in excess of the limit of earnings below which he is eligible to receive Social Security payments, as shown in the concluding sentence of paragraph 2 of the above mentioned section. It is only with respect to "Other Pension" (not a "Public Pension") that there is a limitation of the deduction in terms of the proportional amounts contributed by the employer and employee respectively.

In the process of drafting the paragraph of the Agreement under discussion, we considered whether or not, following the "provided, however" clause in about the middle of the paragraph, we should add parenthetically "(not a Public Pension)" following the words "Other Pension" in order to avoid the possibility of misunderstanding of the distinction between the two; it was decided to omit the parenthetical phrase in view of the definitions which were included in the paragraph. However, since such misunderstanding has arisen, it appears that the phrase might well have been inserted.

A. R. MATHIESON  
Director of Pension Administration

New York City,  
March 29, 1950

## Rebuilding Plant

LIBERTY LIMESTONE CORP., Buchanan, Va., is rebuilding its agricultural limestone and fertilizer filler plant and sand manufacturing plant following a recent \$75,000-\$100,000 fire.

	Stable $\alpha\text{-CaSO}_4 \cdot \frac{1}{2}\text{H}_2\text{O}$	Metastable $\beta\text{-CaSO}_4 \cdot \frac{1}{2}\text{H}_2\text{O}$
Normal consistency (c.c. $\text{H}_2\text{O}$ /100 gm.)	35	90
Neat setting time (minutes)	15-20	25-35
Expansion	.0028	.0016
Specific gravity	2.757	2.637
Specific volume	52.65	55.05
Heat of hydration (calories gram formula mass)	4100	4600
Heat of hydration (B.t.u./lb.)	42.9	48.1
Specific heat (B.t.u./lb. @ 25 deg. C.)	.236	.266
pH at 20 deg. C.	5.35	4.85
Ave. tensile strength (1 hr. after set wet p.s.i.)	500	100
Ave. tensile strength (dry p.s.i.)	1000	200
Average compressive strength (1 hr. after set wet p.s.i.)	4000	400
Average compressive strength (dry p.s.i.)	8000	800
Solubility (grams $\text{CaSO}_4$ per 100 c.c. sol. @ 20 deg. C.)	0.63	0.74

Table VI. Physical properties of  $\text{CaSO}_4 \cdot \frac{1}{2}\text{H}_2\text{O}$ 

of hardwall plasters. Commercial retarders generally are made from protein materials such as hair, horns and hoofs, etc., by treatment with sodium hydroxide to render them soluble in water. These soluble protein materials are extended with lime to make a commercially usable material. They are highly soluble in an alkaline solution and practically insoluble in a neutral solution. They are amphoteric and become insoluble at definite pH values. It is possible, in the setting reaction of hardwall plaster, that the acid properties of the calcined gypsum gradually neutralize the alkalinity of the retarder, rendering the protein compounds insoluble and thus no longer able to delay crystallization or set. Tests of sanded set hardwall plaster, after complete set has taken place, give a pH of 7.0. Approximately 7 lb. of retarder are added to hardwall plaster to control set. The probable maximum hydroxyl ion concentration in an average sample of hardwall plaster is calculated to be approximately 1.95 lb. and to neutralize this quantity of hydroxyl ion to produce a pH of 7.0—at which point the protein material in the retarder is insoluble and no longer active, would require 0.115 lb. of hydrogen ions. Samples of hardwall plaster have been tested in a Blaine permeability apparatus and the results indicate a surface area of 2000 to 3000 sq. cm. per gram. These calculations indicate a layer of hydrogen ions approximately one molecule thick on the surface of the calcined gypsum particles.

Applying the data previously recorded, the heat required to dehydrate gypsum and produce a commercial product, essentially  $\text{CaSO}_4 \cdot \frac{1}{2}\text{H}_2\text{O}$ , can be calculated with sufficient accuracy for all technical purposes as follows:

- (a) Average heat required to decompose  $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$  to kettle product essentially  $\text{CaSO}_4 \cdot \frac{1}{2}\text{H}_2\text{O} = 45.0$  B.t.u. per lb.  $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$  in feed.  
(b) Average heat required to raise

the temperature of calcined product from the feed temperature to kettle discharge temperature equals the specific heat x weight of calcined product produced. (Average specific heat = 0.220.)

- (c) Average heat required and carried off in the water vapor formed from the decomposition of  $\text{CaSO}_4 \cdot 2\text{H}_2\text{O} = \text{CaSO}_4 \cdot \frac{1}{2}\text{H}_2\text{O} + 1\frac{1}{2}\text{H}_2\text{O}$  (water vapor) equals 27/172 (=157) x percentage of gypsum in the feed x average specific heat of the water vapor (.448) x (average calcining temperature—atmospheric temperature).

For gypsum analyzing 96 percent  $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$ ,  $a + b + c = 550,000$  B.t.u. per ton of feed. For a kettle using 7 gal. of oil (148,000 B.t.u. per gal.) per ton of feed, heat supplied to kettle =  $7 \times 148,000 = 1,036,000$  B.t.u. and the practical furnace efficiency =  $1,036,000/550,000 = 53.1$  percent. The general average physical properties of essentially pure  $\text{CaSO}_4 \cdot \frac{1}{2}\text{H}_2\text{O}$  are summarized in Table VI.

## Chemist Corner

(Continued from page 85)

the specific gravity and saponification number are means of checking on whether or not a linseed oil is of the aged type (Table IV).

On the basis of these data it is suggested that a specific gravity determination be used to identify an aged linseed oil if there is any question regarding its type. If the specific gravity is in the range of .948-.953 it can be assumed to be an aged oil. The identification can be confirmed if nec-

essary by determining the saponification number; however, the specific gravity is a much easier test.

Aged linseed oils Nos. 8, 9 and 10 are the standard products of three different companies and according to information received from these companies are produced to have a specific gravity which is most likely within the suggested range of .948-.953. The tabulation below contains the company name, address, their trade name for the aged oil and their specification data for these oils. The order of the companies does not necessarily coincide with the order of the aged oils listed previously (Table V).

Raw linseed oil is sometimes aged by a blowing process so that an aged oil may be a blown oil but the term "aged" is the one commonly used for specifying this type of oil in the protective coatings industry.

One precaution to be observed is occasioned by the fact that on continued exposure to atmosphere, linseed oil is slowly oxidized. If this oxidation proceeds far enough, its value as a dispersing agent is impaired, but this condition is usually indicated by a change in color from a straw yellow to a greenish-yellow tint. Since aged oil will keep almost indefinitely in a closed container, it is suggested that the stock of oil be kept either in a tightly closed metal or brown glass container and the dropping bottle be cleaned and refilled every few weeks with fresh oil stock.

## Summary

When oleic acid is used as a dispersing agent in the turbidimetric determination of the specific surface of Portland cement by A.S.T.M. Method C 115-42, the values obtained for specific surface are inconsistent when a trace of moisture is present. These erratic results which are caused by foaming also occur frequently when the relative humidity of the air is high.

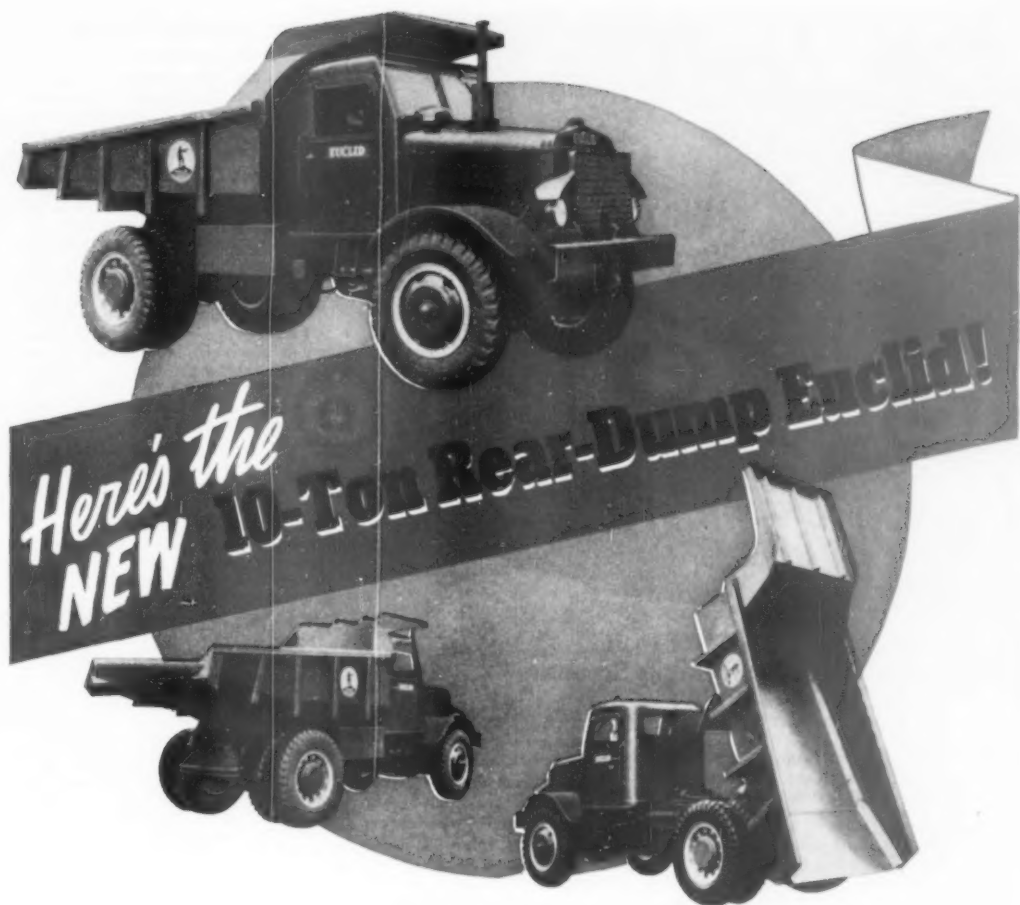
Aged linseed oil with a specific gravity of .948-.953 when used as a dispersing agent for cement in kerosene in place of oleic acid is not sensitive to traces of moisture or high humidity laboratory air as evidenced by the fact that no foaming is caused under these conditions and the precision of the specific surface determination is not impaired.

## Seeks Dredging Permit

ARKADELPHIA SAND AND GRAVEL Co., Arkadelphia, Ark. has applied to the Corps of Engineers for a permit to dredge sand and gravel from the Ouachita River near Arkadelphia.

Company	Product Name	Company Specifications	
		Specific Gravity	Saponification No.
Spencer Kellogg & Sons, Inc. Buffalo, N. Y.	Aged Linseed Oil	.948-.951	195-205
	Aged Linseed Oil	.948-.955	192-196
John T. Lewis & Bros. Co. Philadelphia, Penn.	Aged Raw Linseed Oil	.948-.952	196-203

Table V: Specification data for aged oil



This Rear-Dump "Euc" meets the demand for a smaller capacity hauling unit for heavy off-the-highway service in mines, quarries, construction, and industrial work. It is engineered and built to the same rigid standards of design and construction as larger Rear-Dump Euclids—job proved for low cost hauling under the toughest operating conditions.

Powered by a 125 h.p. diesel engine, this new Euclid has a top speed with full payload of 35.4 m.p.h....the transmission has ten forward and two reverse speeds. Spring mounted axles permit maximum travel speed

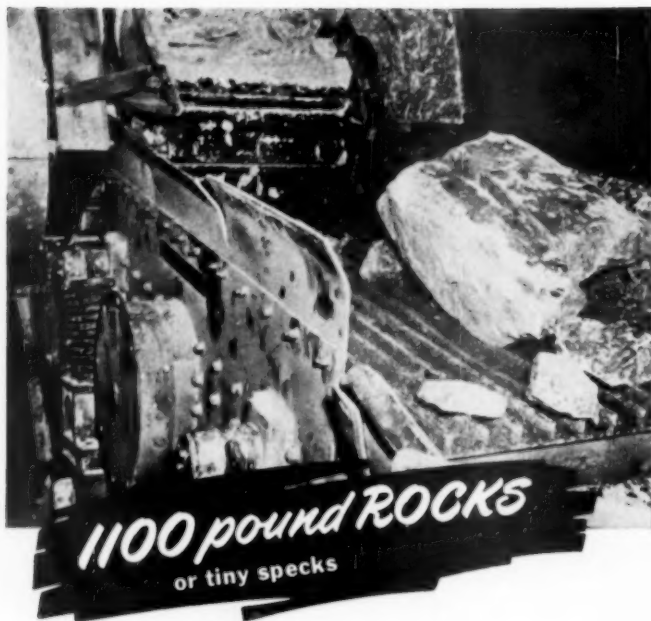
on the haul road... a form fitting driver's seat mounted on hydraulic shock absorbers assures maximum riding comfort.

The simple design and rugged construction of the 10-ton Rear-Dump Euclid mean long life in heavy duty hauling and assure low maintenance and operating costs that result in greater job profits.

A Euclid Distributor will be glad to discuss your present or future job requirements and show how this 10-ton Rear-Dump Euclid gives trouble-free, efficient performance.

The EUCLID ROAD MACHINERY Co., Cleveland 17, Ohio





## ... Hewitt-Robins Vibrating Screens Process Them All!

Take a look at that big brute of a machine. It's a vibrating screen—a Hewitt-Robins Heavy Duty Scalper.

The big rock you see on its deck is a 3 x 2 x 1½ lump of ore weighing about 1100 pounds. The Scalper handles loads like this at 1000 tons an hour. Yet, it absorbs those loads—and its own vibration—so completely that a coin placed on edge on the base beams will stand up without toppling over while the machine is running!

The same company that makes this big brute also makes a small screen called a Ceramic Slip Lawn. This lawn is so precise in action, so effective in operation, that it finds and removes tiny specks of impurities—about ½ pound in every ton of material—from clay slip for pottery plants.

Think of that range—from 1100 lb. rocks to tiny specks! It's the best proof of all that Hewitt-Robins can satisfy

your vibrating screen demands!

Just look at these facts: Hewitt-Robins originated the circle-throw principle for vibrating screens. Hewitt-Robins created the elliptical throw. Hewitt-Robins pioneered in both 4-bearing and 2-bearing vibrators. Hewitt-Robins introduced the full-floating principle of vibration-absorption.

Whatever you want in vibrating screen equipment, you can safely rely on Hewitt-Robins. Tell us your needs; we will supply the answer. Write to Robins Conveyors Division, 270 Passaic Avenue, Passaic, N. J.

**HEWITT-ROBINS**  
**VIBRATING SCREENS**

**HEWITT-ROBINS**  **INCORPORATED**

BELT CONVEYORS (belting and machinery) • BELT AND BUCKET ELEVATORS  
CAR SHAKEOUTS • DEWATERIZERS • FEEDERS • FOAM RUBBER PRODUCTS  
FOUNDRY SHAKEOUTS • INDUSTRIAL HOSE • MINE CONVEYORS • MOLDED RUBBER GOODS  
RUBBERLOK ROTARY WIRE BRUSHES • SCREEN CLOTH • SKIP HOISTS • STACKERS  
TRANSMISSION BELTING • VIBRATING CONVEYORS, FEEDERS AND SCREENS

## Labor Relations Trends

(Continued from page 49)

tative. The defendant union, failing in its efforts to secure such a contract amicably, resorted to picketing a construction job upon which the employing contractor was under contract to install plumbing equipment and fixtures, not for the purpose of bettering the wages, hours or conditions under which the employees were working (for the union admittedly had no dispute with the employer on that score), but for the sole purpose of coercing the employer into signing a closed-shop contract, to which he did not want to become a party, and which would necessarily require him in its performance either to discharge his non-union employees, or compel them as a condition of further employment, to become members of the union.

"We can think of no situation more repugnant to the spirit of the declared public policy of the state than this, nor one more likely to appeal to the considerations of a court of conscience. In either course open to the employer under the facts of the case, he stood to suffer injury. If he refused to execute the contract with the union, he faced the possible consequence of damage to his business as a result of picketing and other means of labor organization sanctions and pressure. If he executed the contract, and then in its fulfillment turned his employees out because they were not members of the union, or required them against their will to become members of a union as a condition of further employment, he would face the possibility of a criminal prosecution for coercing or intimidating his employees in the enjoyment of their legal rights, including the right of free choice whether to join or not join a union. Furthermore, he would face the possibility of a civil suit for damages by the discharged employees, for by discharging them on account of failure to become union members, he would certainly be guilty of denying or abridging their constitutional right to work."

\* \* \*

"Like the strike, picketing is legal only to the extent that its purposes are within the legal ambit of labor activity. In the present case it is conceded by the defendant union that no labor dispute existed between the employer and the union, in the commonly understood sense of the term. The avowed immediate object of the picketing by the union was to compel the employer to enter a closed-shop contract, obligating him to pursue a course of conduct at variance with the settled public policy of the state and one which would subject him to criminal and civil penalties.

"We hold that under the facts of the case, the picketing was in pursuance of an unlawful object, and hence enjoined. This holding is not in conflict with our previous holdings\*\*\*\*."

## Instrumentation

(Continued from page 63)

sciously men start to judge the correct reading by the angle of the pointer as much as by its actual reading. This principle could not be readily carried out with the draft gauges due to lack of space. The large rotating pointer on the speed chart is superlative in this respect. Big indicating instruments are always desirable for easy visualizing at a distance.

5. Draft gauges calibrated for easy reading in their normal range. Back illumination is important.

6. The legend of the four points on the potentiometer was worked out with great care and obtained at small extra cost, as follows:

- |                         |             |       |
|-------------------------|-------------|-------|
| a. Fan                  | Black Dots  | ..... |
| b. Kiln exit gases      | Green Cross | XXXXX |
| c. Lining, 55-ft. point | Blue Circle | OOOOO |
| d. At the hood          | Red Mark    | +     |

This is found to be the most readable record we have ever experienced. The operators use it advantageously. We consider dots with adjacent indicating numerals to be an objectionable system of legends.

All the temperature points on a kiln should be recorded on a single chart so that relative temperature effects can be readily observed and studied. However, there should not be more than one kiln to a chart. Thereupon, during normal operation, recordings do not cross each other and confusion is avoided; each record stays in its own territory. Comparison of the charts is readily facilitated.

Fig. 4 shows the log sheet employed on this kiln. Even the recorded readings are entered. This fixes the reading on the mind of the operator. But more importantly, the log is more readily studied for past comparative performance for the determination of long swing changes that may take place in the performance of the kiln for better or worse.

The reader probably will note that the principal omission from the board is a kiln gas analyzer. The  $O_2$  recorder is doubtless the correct one. But our kilns are exposed to freezing, and we do not have a special instrument man for servicing. Hence we are delaying the installation of such an analyzer. Also we still have hopes of the efficacy of the smoke detector which is all-electric and not subject to the difficulties of sampling or freezing. At least, we have space for another instrument on the board.

Fig. 5 shows the Unax-type coolers. The use of these requires the specialized instrumentation as noted above. They cause the necessity of the draft reading on the hood and make the thermocouple at the discharge dam more effective.

Note the insulation of these coolers for the conservation of the heat regenerated from the lime.

# BIG OUTPUT

## ...small outlay

(only \$5200\*)



# BANTAM

- Drives anywhere, anytime, at speeds up to 35 m.p.h.
- Goes into spots where bigger, heavier rigs stop
- Moves 70-80 yds. per hr. . . lifts up to 10,000 lbs.
- Gets more productive work done at less cost per job
- Loads trucks...stockpiles materials...cleans up pits
- Does pioneer stripping . . lifts pipe, slabs, steel, etc.
- Choice of 6 interchangeable front end attachments

\*Price based on 3/4 yd. dragline, less truck, F.O.B. Waverly, Iowa. Trucks and half-trucks available through factory at \$1350 to \$1850 plus mounting. All prices subject to change without notice.

NR 21

**TEAR OFF and MAIL THIS HANDY COUPON NOW!**

SCHIELD BANTAM CO.  
216 Park St., Waverly, Iowa

☐ Send full details on new Bantam checked at right

- ☐ Shovel
- ☐ Crane
- ☐ Dragline
- ☐ Clamshell
- ☐ Trench Hoe
- ☐ Pile Driver

Name \_\_\_\_\_

Occupation or Business \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_

State \_\_\_\_\_

NR 21

# SCHIELD BANTAM

**The THRIFTY machine with the BIG earning range**



## "Trouble-free screening is a habit with these SECO VIBRATING SCREENS"

says Sherman B. Saunders of W. F. Saunders & Son, Nedrow, N. Y.



The Seco vibrating screen pictured above has been on the job over nine years in the modern sand and gravel plant of W. F. Saunders & Son, Nedrow, N. Y. Not only does it do a perfect job of screening — but it still operates smoothly and has never been shut down for repairs.



Here you see the second Seco screen in use in the Saunderson plant. This Seco screen was purchased because of the trouble-free performance record of the first one installed over nine years ago. Together they produce about 120 tons of sand and gravel per hour. Everywhere, on all types of screening jobs, from ag-line to rip-rap, Seco screens are winning acclaim on performance.

Let Seco screening experts help you get trouble-free screening results. Models to fit every requirement.

Write Dept. M for new Seco Catalog No. 203.



### SCREEN EQUIPMENT CO., INC.

1752 WALDEN AVE

BUFFALO 21, NEW YORK

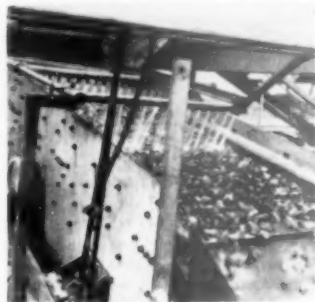
In Canada, United Steel Corp. Ltd., Toronto, Ont.

### Gravity Operation

(Continued from page 66)

Dorco sand machine flows to a Tel-smith sand drag which discharges on to an 18-in. stockpiling conveyor. The sand is reclaimed by a Haiss loader.

An important feature of the plant and one to be emphasized is that all the sand recovery equipment rests on the ground, or essentially so, with the scrubber superimposed above so



Three-deck vibrating screen mounted over bins

that flow to the two sand recovery units is by gravity. This makes a simple, relatively inexpensive type of construction and is easy to supervise. All the conveyors in the plant are of Barber-Greene manufacture and a majority of conveyor belts were supplied by Hamilton Rubber Co., Trenton, N. J.

Concrete sand from the sand machine falls to an 18-in. inclined belt which delivers to one of two bins. Paralleling this belt is another (24-in.) inclined belt that carries the intermediate sizes from the scalping screen and the throughs from the secondary crusher to a 4- x 12-ft. wet, three-deck Seco vibrating screen mounted over a block of seven Blaw-Knox steel hopper-bottomed bins for truck loading. The screen has 1-in., 1/2-in., and 3/4-in. wire on it respectively. The 3/4-in. material falls to a short shuttle belt and can be conveyed to one of two bins. The set-up is so arranged that most of the 1/2-in. material is blended into the larger stone and comprises 30 percent of the larger size. There also are two bins for concrete sand. By having two bins, the sand is allowed to drain overnight. The sketch shows the capacity and arrangement of the seven loading bins. Water for the operation is delivered by a 900 g.p.m. Carver pump. Truck scales are located alongside a relatively large concrete block building that serves as a repair shop and offices.

Mr. Bauer was assisted in the designing and engineering of the plant by Al Amos and Bob Edgerton of A. R. Amos, Jr., engineers, and agents for Tel-smith and Barber-Greene equipment in this territory. Mr. Bauer also supervised the construction of the plant which was built by the company.

## Dust Control

(Continued from page 87)

tion from the sag of a conveyor between two troughing rolls; the heavier the load, the more the sag and the greater the motion imparted to the roller tipped lever arm operating the valve (Fig. 1). While such belt-operated valves can shut off the pressure on the water line under a "no load" condition, yet they will not prevent the flow of water from that part of the line lying beyond a valve and lying at a lower elevation. Such a condition is particularly unfavorable in hillside or gravity flow plants; the lower nozzles drain the line, and without sufficient pressure to form vapor or mist. The stream or drip from the drainage causes excess moisture with consequent stickiness and build up of material in chutes, transfer points and on screen cloth.

This difficulty can be overcome by placing a second valve to work in reverse, that is, to *open* when the conveyor is empty or under no load. Such an arrangement allows most of the line water to drain through a by-pass pipe rather than through the various nozzles along the line and its branches.

### Importance of Clean Water

The importance of clean water, free from most particles, even "dissolved" or suspended particles, such as clay, can hardly be over-emphasized. The fine vapor and mist nozzles have an orifice that is easily clogged. The screens used in each of these fine nozzles are readily plugged also, even by accumulations of clay or fine silt. It is advisable to use a coagulant, such as alum, at the water supply source if clay is present in the supply. It is also desirable to have one or more strainers in the main line and each branch should be equipped with at least one. Each strainer should have a blow-down valve and a valve should be placed in the line ahead of it for use in strainer repair and clean out work.

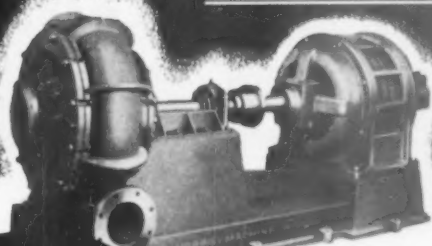
The branch that feeds each battery of nozzles should be equipped with one strainer, set fairly close to the nozzles. Like those of the main line, these should be provided with blow-down and shut-off valves.

### Water Pressure and Velocities

Satisfactory water delivery at the vapor, mist or spray nozzles is dependent not only on the pressure, but also on the uniformity of pressure. Nozzles set for a satisfactory delivery at a given pressure of, say 50 p.s.i., will be found to be unsatisfactory if sharp variations of pressures take place; if increased, the material may become too damp, if decreased it may become too dry, or the nozzles may drip, causing moisture concentration.

It is desirable to use pipe of sufficient size in both main and branch

**PROVED BETTER...**  
because they  
**WORK BETTER!**



## Morris DREDGING PUMPS

*In almost any dredging operation... they give greater performance at lower maintenance cost*

- Purposely made for high vacuum, Morris Pumps dredge to greater depths and give up a higher percentage of sand, gravel and other abrasive materials.

- The proper relationship between shell and impeller designs produces smooth, easy flow of materials... without eddies, turbulence or excessive friction losses. This feature alone reduces wear, abrasion and power consumption.

- When long service finally requires renewal of a part, replacement on the Morris Dredging Pumps can be made easily, quickly and economically... with only slight interruption of service.



**Morris Will Build a Dredge for Your Particular Job...**

- All the components of the dredge—hull, rigging, hoist, spuds, ladder, ladder head, and cutter will be designed and built for the individual type of deposit and service you require. All excavating and auxiliary pumps are of the famous Morris Centrifugal type... driven by electric, Diesel or steam power, according to the needs of your job.

**Morris Dredges Are Custom-Built**  
... Yet Moderate in Cost

**WRITE TODAY!**

Send for Free Bulletin No. 177. It illustrates and describes a wide range of dredges.

**MORRIS MACHINE WORKS**  
Baldwinsville, N. Y.

Branch Offices in Principal Cities

**Morris**

**CENTRIFUGAL PUMPS**



# Save... switch to WARSOP drills and breakers

## It's real economy

- \* Low Initial Cost
- \* Low Maintenance Cost
- \* Low Operating Cost
- \* Low Transportation Cost

No Battery • Positive Dual-Fan Cooling  
Variable Speed Control • No Springs  
Completely Self-Contained

There's real Savings when you use Warsop Portable Rock Drills and Breakers on all types of construction and demolition work. With Warsop hard-hitting power tools you need no cables, no hose. Compact and light in weight, they are easily transported from job-to-job.

Wherever you have breaking or drilling jobs that require only one or two machines figure to use WARSOP. You'll save time, labor and equipment costs.

Write for descriptive folders and specifications.

**WARSOP POWER TOOLS, Inc.**  
347 NORTH 12TH STREET, PHILADELPHIA 7, PA.



WARSOP  
5-6 BREAKER

WARSOP  
ROCK DRILL

# Warsop

**PORTABLE DRILLS—BREAKERS**  
self-contained—gasoline engine driven



Type "MR" 3 1/2' x 8' Double-deck

IT WILL PAY YOU TO INVESTIGATE

## UNIVERSAL

HIGH-SPEED VIBRATING SCREENS BEFORE YOU BUY!

1950 MODELS OFFER STEPPED-UP CAPACITY ON YOUR MOST DIFFICULT SEPARATIONS.

Get the facts on this popular Vibrating Screen today! Catalog No. 109 on Screens and Screening.

**UNIVERSAL VIBRATING SCREEN CO.**

RACINE - WISCONSIN

lines to give low velocities to the water they are carrying. The higher the velocity the less effective are tee traps along the line in trapping out scale, sand, etc. It is desirable to put the tee traps along horizontal runs of line and also at right angle turns in the place of elbows. The tees can be plugged, or, nipples and plugged to form the trap. At times a valve is set at the bottom of the trap for blow down use.

It is advisable to use a tee, nipple and ell ahead of downward pointed nozzles having small openings, otherwise the nozzle forms a trap and its screen or openings become clogged.

### Types of Nozzles

A number of types and manufacture of nozzles have been used which proved satisfactory after trial and error tests. Flat as well as circular patterns are used on vapor, mist and spray nozzles. The use of air-water nozzles for atomizing effect and the use of a humidifier such as found at vegetable stands offer possibilities.

This article certainly does not present the "last word" on the subject of dust control by water vapor, mist and sprays. It is presented with the thought in mind that perhaps it may prove of benefit to the industry, and that others will present their ideas and findings on the subject.

Reference: Paper by Theodore Hatch, Industrial Hygiene Foundation of America, and presented at the annual convention of the National Crushed Stone Association Convention, 1947.

### Pennsylvania Lime Consumption

MORE THAN a million tons of lime in various forms were used on Pennsylvania farms in each of the four years 1944 through 1947, according to the state department of agriculture. Biggest lime year of the four was 1946 when 1,472,500 tons were consumed in the state, according to amounts reported by manufacturers when making application each year for registration with the Bureau of Foods and Chemistry.

Consumption of lime for 1944 totaled 1,236,630 tons; for 1945 it dropped to 1,049,200 tons and advanced to 1,259,350 tons in 1947. According to G. J. Guhlman, state chemist, 107 licenses were issued in 1948 to lime manufacturers offering lime for sale for agricultural use in Pennsylvania. They covered 183 different brands of lime products.

### Correction

In the February, 1950, issue of ROCK PRODUCTS, p. 118, the figure 700 in the seventh line from the bottom of column three should read 70. The error appeared in the article, "Thermodynamics of Lime Manufacture."

## Haulage by Rubber Tires

(Continued from page 73)

tion, and depreciates only a fraction of the cost of a dump unit. The tractor can push about twice as much as it can pull because the push load settles against the spin of the driving wheels. At the New Zealand installation, the full train of cars is pushed up grade and pulled down, giving maximum protection to any person who may be working below. The rails are straight on the grade as a curve may cause trouble by skewing the tractor, which is the chief danger that must be prevented. No trouble is experienced with curves in the line on a level grade, for it is impossible for loaded cars to run back on the tractor by gravity. The bumpers on the tractor for this work must be as close together as possible to guard against rearing or skewing. On the level main line, the tractor can easily shunt a train of 12 or 15 quarry cars of 17 tons gross each. Up grade, three cars can be pushed at 8 m.p.h. or five cars at 5 m.p.h.

A rubber-tired tractor is not a completely satisfactory answer to quarry haulage problems, the company management emphasizes, but works best in quarries where (1) the face is over 20 ft., (2) the haul is over 250 yd., (3) the grade is about 1 in 20, (4) the installation is semi-permanent, and (5) the daily output is 100 to 600 tons. Where a heading is being worked and the shovel reach is comparatively short, a pair of large capacity cars is required for continuous operation. In fact, the company has found that the largest possible size quarry cars should be used, since they are generally easier to spot and handle, fewer are required, they clean out better and visibility is better.

The New Zealand company uses a No. 6 Jaques-Traylor gyratory crusher with a capacity of 60 t.p.h. Plus 12-in. stone is broken by two C.P. breakers. The transport system is able to keep ahead of the crusher and the crusher is able to keep well ahead of the screening plant, with the result that down time is minimized.

A summary of the advantages of using rubber-tired tractors instead of trucks or locomotives includes (1) freedom from hold ups; if a car breaks down it can be replaced immediately; if a tractor must be repaired one can take the place of two; (2) the comparatively light weight of the tractor gives a greater pay load on a steep grade; (3) tractors are mobile and time is not wasted shifting them into position; (4) initial expenditure and subsequent maintenance costs are considerably lower; and (5) the driver is well clear of the loading operation and at the same time has clear vision.

## City Gravel Pit

THE CITY of Vinita, Okla., is considering plans for the operation of a gravel pit. The city currently is using a gravel pit belonging to the county.

# Harder Ball

for  
**Harder  
WEAR**

**SHEFFIELD**

**MOLY-COP**

TRADE MARK REG.  
**COPPER-MOLYBDENUM-ALLOY**

*Grinding Balls*



Regular  
Carbon Steel  
Ball

Special Alloy  
Moly-Cop  
Ball

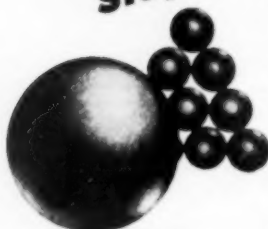
Extremely hard, right to the core, Moly-Cop Grinding Balls retain their spherical shape longer under the most severe conditions, giving you more tons per mill hour, at a lower cost per ton of production. Note the structural comparison of fractured Moly-Cop and Regular Carbon balls at the left.

Less frequent charges of Moly-Cop balls reduce freight and handling charges. Thus, grinding costs are being cut by Moly-Cop balls in virtually every mining country. Your own cost sheets will reflect this economy when you specify Moly-Cop Grinding Balls.

Carbon and Alloy Steel,  
Ingots, Blooms, Billets,  
Plates, Sheets, Merchant  
Bars, Steel Joists,  
Structural Shapes,  
Road Guard,  
Reinforcing Bars  
Welded Wire Mesh,  
Wire Products, Wire  
Rods, Fence, Spring  
Wire, Nails, Rivets,  
Grinding Media, For-  
gings, Track Spikes, Bolt  
and Nut Products

**SHEFFIELD STEEL  
CORPORATION**  
HOUSTON KANSAS CITY TULSA

Export Representative:  
**ARMCO INTERNATIONAL  
CORPORATION**  
Middletown, Ohio



CF&I GRINDING BALLS

A solid hit flattens a baseball momentarily, but the horsehide is generally ready to go with the next pitch. CF&I Grinding Balls never flatten... they're made for the beating that comes from continuous abrasion and impact.

They're hot-forged and carefully heat treated for uniform hardness all the way through. They stay round... providing maximum grinding surface throughout their long life.

That's why they're used at 54 of the 61 major mining properties and cement plants using forged steel grinding balls in the eight western mining states.

For maximum grinding per dollar, specify CF&I Balls and Rods.

## The Colorado Fuel and Iron Corporation

GENERAL OFFICES: DENVER, COLORADO

PACIFIC COAST SALES: THE CALIFORNIA WIRE CLOTH CORP.  
OAKLAND, CALIFORNIA

### OTHER CF&I PRODUCTS FOR THE MINING INDUSTRY

WICKWIRE ROPE, INDUSTRIAL SCREENS, MINE RAILS & ACCESSORIES, REALOCK FENCE, CLINTON WELDED WIRE FABRIC, GRADER BLADES AND OTHER CUTTING EDGES



CF&I GRINDING RODS

## Manufacturers' News

Link-Belt Co., Chicago, Ill., announces that David E. Davidson has been elected vice-president of sales.



Eugene P. Berg

Columbus Basile has been named vice-president of operations, and Eugene P. Berg, formerly assistant general manager, has been appointed general manager of the Pershing Road plant, to succeed Mr. Davidson. D. W. Lehti has been reelected president of the company; G. H. Olson, vice-president; and H. E. Kellogg, treasurer and secretary.

Mr. Davidson, a mechanical engineering graduate of Armour Institute of Technology (now I.I.T.) has been general manager of the Pershing Road plant since 1947. He joined the company in 1924 at the Caldwell



Columbus Basile

plant, serving successively as draftsman at Caldwell and Pershing Road plants; sales engineer at Atlanta plant; district sales engineer at the Detroit warehouse; district sales manager at Indianapolis; assistant chief engineer at Pershing Road, and later general manager.



David E. Davidson

Mr. Basile, who has been superintendent of the Caldwell plant since 1947, joined the Pershing Road plant in 1928. He did general shop work until 1938, when he became division manager for Sears-Roebuck & Co. He returned to Link-Belt in 1941 and served successively as foreman of the machine shop at Link-Belt Ordnance Co., Chicago; head of time-study and methods at Philadelphia, and then as superintendent at Caldwell.

Mr. Berg is a mechanical engineering graduate of Purdue University. He began his career with the company by working in the Pershing Road shop during vacations in 1929 to 1937. He has served successively as supervisor of the methods department at Pershing Road; general foreman of the steel shop; works manager at Philadelphia; general superintendent at Pershing Road, and then assistant general manager.

Towmotor Corp., Cleveland, Ohio.



Read each month by 14,102 in the industry. Join this progressive group by sending your subscription order. Two years, \$3.00 — One year, \$2.00.

ROCK PRODUCTS, the recognized authority of the non-metallurgical industry, is the most widely read and most often quoted magazine serving the field.

Rock Products Editors seek out and evaluate new production methods that permit lower costs and greater profit. You can benefit as each of 14,102 readers benefit by having your own personal copy for monthly study. Order to-day.

**ROCK PRODUCTS**

309 W. Jackson Blvd.  
Chicago 6, Illinois



has inaugurated a series of regional sales meetings outlining company policies and programs for 1950. Meetings will include talks by officers of the company and films showing latest techniques being used in selling today.

**Cambridge Wire Cloth Co.**, Cambridge, Md., announces that J. C. Peters, with offices in Boston, Mass., and New York, N. Y., has been assigned to the New England territory.

**Gilman Paper Co.**, New York, N. Y., has opened a Western sales office in the Daily News Bldg., Chicago, Ill., under the management of Ernest A. Kandler, who has been with the company for over 25 years.

**Detroit Diesel Engine Division**, General Motors Corp., Detroit, Mich., has appointed Sioux Road Equipment, Inc., Sioux Falls, S. D., as distributors for Series 71 GM diesel engines in South Dakota.

**Signode Steel Strapping Co.**, Chicago, Ill., has appointed James R. Williams as sales promotion manager who, in addition to his sales promotion duties, will direct advertising and publicity activities.

**Mack Trucks, Inc.**, New York, N. Y., has opened free training courses on diesel-powered trucks and buses in Boston, Albany and New York City for truck owners, maintenance superintendents, shop foremen, and garage or service station mechanics. Sessions run two hours one evening a week for ten weeks. Schedules are being arranged for courses from coast to coast. More than 4000 truck and bus maintenance men, including executives, foremen, drivers and service men, attended the first session in New York.

**Fairbanks, Morse & Co.**, Chicago, Ill., announces that Robert H. Morse, Jr., formerly vice-president in charge



Robert H. Morse, Jr.

of operations, has been elected president of the company. He succeeds his father, Colonel Robert H. Morse, who has been elected chairman of the board. Colonel Morse has been president since 1931 and has spent 55 years with the company. Previously Mr. Morse Jr. was vice-president in charge of sales and assistant general sales manager. He joined the company in 1916 in the foundry at the Beloit, Wis., plant, where his father also started. Mr. Morse Jr. is also president of the Diesel Engine Manufacturers Association.

**The Oliver Corp.**, Cleveland, Ohio, announces that the trade name "Cletrac" covering tractors formerly manufactured by the Cleveland Tractor Co., which was acquired by the Oliver Corp. some years ago, has now been dropped, and that henceforth the

## "SUBWAY" Shows What "Standard of Quality" Means in AIR HOSE

The long, reliable service that every length of "SUBWAY" delivers, is evidence that "Standard of Quality" means the finest air hose construction that men and machines can produce.



**WRAPPED DUCK CONSTRUCTION**  
1/2" to 1 1/4", Max. Lengths of 50 ft.

Strong, tough, durable . . . to keep heavy-duty air tools on the job longer, with maximum drilling economy. Red rubber cover is highly resistant to severe abrasive wear. Balanced construction assures equally long life for tube, carcass and cover . . . a big saving in hose replacement costs. Flexible, light in weight, easy to handle

Contact Our Nearest Branch for Details and Prices



## GOODALL RUBBER COMPANY

GENERAL OFFICES, MILLS and EXPORT DIVISION, TRENTON, N. J.

Branches: Philadelphia - New York - Boston - Pittsburgh - Chicago - Detroit - St. Paul - Los Angeles - San Francisco - Seattle - Portland - Salt Lake City - Denver - Houston - Distributors in Other Principal Cities

MAKE YOUR OWN

## SINTERAGG

LIGHT WEIGHT AGGREGATE BY THE  
DWIGHT-LLOYD\* SINTERING PROCESS ON  
DWIGHT-LLOYD\* SINTERING MACHINES.

OVER 40 YEARS EXPERIENCE SINTERING  
ORES AND NON-METALLIC MATERIALS.

**SINTERING MACHINERY CORP.**  
NETCONG, N. J.

\*Reg. U. S. Pat. Off.

# Tuffy

TRADE MARK

## SLINGS

Entirely Unlike Any Other

Scores of wires, stranded into 9 parts, then machine woven into an interlaced wire fabric—that is the unique patented construction which gives Tuffy extraordinary flexibility and stamina.

**Super TOUGH**—On every kind of load, under all kinds of pulls and with every type of hitch, Tuffy Slings have proved their superiority and universal adaptability.

**Super-FLEXIBLE**—Tie Tuffy Slings into knots, kink them, flatten the eyes. Observe how many more times you can straighten Tuffy Slings out without material damage. Note too, that cutting any one of the 9 parts will not result in stranding the sling.



### Tested Strength Twice Safe Working Load Limit

Each Tuffy sling is proof-tested to twice the safe working load indicated on its metal tag. Tuffy's interlaced construction makes possible eye splices averaging 95% of fabric strength.

### 9 Types—Factory Fitted Or Unspliced on The Reel

Try any one of the 9 factory packaged types—for choker, basket or bridle hitches. Prove to your own satisfaction their money saving worth to you. Or, if you're rigged for splicing—Tuffy interlaced wire sling fabric is available on the reel.



**union**  
Wire Rope  
CORPORATION

2156 Manchester Ave.,  
Kansas City, Mo.  
Send Tuffy Sling details.

FIRM NAME \_\_\_\_\_  
ADDRESS \_\_\_\_\_  
CITY \_\_\_\_\_ STATE \_\_\_\_\_

tractors will be known as the Oliver crawler tractors.

Chase Bag Co., Chicago, Ill., announces that the Kansas City branch has been presented the safety award flag of the Liberty Mutual Life Insurance Co. for outstanding accomplishments including its record of compiling over 500,000 man-hours of production without a day of lost time.

Caterpillar Tractor Co., Peoria, Ill., has appointed Frank S. Foster as assistant sales manager of the Western division. He is replacing Truman E. Sage who has resigned to join the Northern Commercial Co., Seattle, Wash., Caterpillar distributor for Alaska. Gordon J. Fowler, district representative in the San Joaquin Valley, Calif., has been named to succeed Mr. Foster as assistant sales manager of the Eastern division.



Frank S. Foster



Gordon J. Fowler

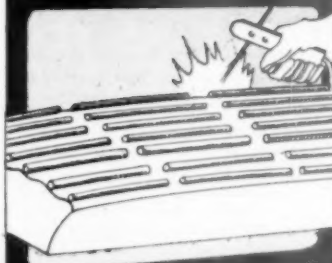
Mr. Foster was born in Wyoming, Ill., attended Bradley University and the University of Wisconsin, where he majored in economics. He joined the general sales department in 1945 as a consultant and soon thereafter became manager of the sales service division. In 1947, he was appointed district representative in the Eastern sales division. One year later he was promoted to assistant Eastern sales manager.

Mr. Fowler is a native of Alabama and was graduated with a B.A. degree from Alabama Polytechnic Institute in 1933. He joined Caterpillar in 1944 as a sales trainee and became district representative, Eastern division, in 1945. He was transferred to the Western division as district representative in 1946.

Mr. Sage became associated with the company in 1927 and served in the accounting and purchasing departments for eight years. He then joined the sales training division and was appointed Western division district representative in 1946. One year later he became assistant sales manager of the Western division.

Concrete Pipe Machinery Co., Sioux City, Iowa, announces that production is in full swing at the new plant purchased in Sioux City two months after a disastrous fire early in January destroyed the old plant and caused an estimated loss of \$100,000. The new pipe plant will be completed this summer when the new Model "TT" machine will be put into operation and

## REBUILD WORN CRUSHER JAWS



with

**MANGANAL**

T.M. Reg. U.S. Pat. Off.

11% - 13% MANGANESE-NICKEL STEEL

## ROUND APPLICATOR BARS

- **WORN JAWS** are expensive scrap . . . it is far less expensive to rebuild than replace.
- **REBUILT JAWS** usually outlast new ones because MANGANAL Rolled Applicator Bars are denser than castings.
- **JAWS CAN BE REBUILT** a number of times, thus outlasting several new ones.
- **ROUND APPLICATOR BARS** are available in 11 sizes to fit all degrees of wear.
- **APPLY APPLICATOR BARS** with MANGANAL Bars or Special Tite-Kote Welding Electrodes.

Write **TODAY** for **FREE COPY** of "Manganal Marketer"

. . . Gives Helpful Suggestions for Repair of Quarry, Mining & Contractors' Equipment.

NAME OF NEAREST DISTRIBUTOR  
UPON REQUEST

**STULZ-SICKLES CO.**

SOLE PRODUCERS

91 N. J. Railroad Ave., Newark 5, N. J.

be ready for inspection, also the new Model "D" drain tile machine. The company wants the pipe industry to know that it is again taking orders and making deliveries on its machines and supplies.

**Union Bag & Paper Corp.**, New York, N. Y., has appointed C. L. Reynolds as control manager, succeeding W. A. West who has resigned. Mr. Reynolds was formerly assistant to the director of multiwall bag sales. Sydney K. Bardley, formerly assistant director, has been named director of multiwall bag sales.

**The Yoder Co.**, Cleveland, Ohio, announces that Joseph A. Jones, formerly with the Pioneer Materials

Co., Pittsburgh, Penn., has been appointed sales manager of the concrete machinery division. He is a graduate of Carnegie Institute of Technology where he studied machine design. Later he entered the concrete industry,



Joseph A. Jones

first in the machinery line, then in cement sales. The Yoder Co. has been building machinery for the metal working industries for 40 years. Three years ago the company entered the concrete machinery field and brought out a compression testing machine designed to enable producers of concrete products and ready-mixed concrete to make their own tests.

**Construction Industry Manufacturers Association**, Chicago, Ill., announces that seven new directors have been elected to serve for three years, namely: Leonard W. Beck, vice-president, Cummins Engine Co.; C. F. Boyd, vice-president, Galion Iron Works & Mfg. Co.; E. B. Hill, vice-president and general manager, Road Machinery Div., Gar Wood Industries; Kenneth Lindsay, vice-president, Iowa Mfg. Co.; F. Salditt, vice-president, Harnischfeger Corp.; Gail E. Spain, vice-president, Caterpillar Tractor Co.; and Julien R. Steelman, vice-president, Koehring Co. Officers elected are Ralph K. Stiles, Austin-Western Co., president; William E. Miles, The Oliver Corp., 1st vice-president; B. F. Devine, Chain Belt Co., 2nd vice-president; Julien R. Steelman, secretary-treasurer; and Harold F. Hess, executive vice-president.

**Caterpillar Tractor Co.**, Peoria, Ill., announces that Hubert D. Boggs, superintendent of the steel fabrication factory in Peoria, has been named factory manager at Joliet. Walter J. Gottschalk, insurance manager in the industrial relations department at Peoria, has been appointed personnel manager at the new plant. Robert A. Morgan, manager of office methods and procedures in the accounting department at Peoria, has been made chief accountant at Joliet. W. G.

## For Your Feeding, Conveying and Separation Problems

# SYNTRON

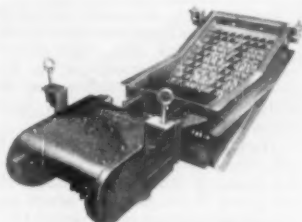
**WILL HANDLE** — most all types of bulk materials — from light, fine powders to heavy, coarse lumps — hot or cold — wet or dry.

**AT** — variable controlled rates from pounds to hundreds of tons per hour.

**TO** — crushers, driers, ball mills, belt conveyors, etc.



**VIBRATORY FEEDERS**  
Up to Hundreds of Tons per Hour — Rheostat Control of Flow



**VIBRATING SCREENS**  
Wet or Dry — Single or Multiple Decks



**VIBRATING GRIZZLIES**  
Both Feed and Scalp With One Unit



**LONG "Vibratory" CONVEYORS**  
No Motors, Gears or Other Mechanical Wearing Parts

3600 vibrations per minute move materials at the desired rate — a turn of the control knob provides from a trickling dribble to a gushing torrent — over plain troughs, grizzly bars or screen. No gears, cams, speed reducers, etc.

Write For Literature

**SYNTRON CO.**

450 LEXINGTON AVENUE

HOMER CITY, PA.

## MANGANESE STEEL CASTINGS---ALLOYED! THE ANSWER TO YOUR wear PROBLEM

We supply 10% to 14% Manganese Steel with special additions of alloys to produce either additional hardness or ductility to permit the parts to better meet severe operating conditions. If your problems include one of finding the proper metal for an application where the going is tough, get in touch with us.

# KENSINGTON STEEL COMPANY

504 Kensington Avenue

Chicago 28, Illinois

## THE WIRE ROPE

You Can  
Depend on—



**HERCULES (Red-Strand) Wire Rope** always lives up to its widespread reputation for outstanding performance... even under the severest conditions. For safe and economical operation, specify **HERCULES** ("Red-Strand").

Made only by —

### A. LESCHEN & SONS ROPE CO.

5909 Kennard Ave. St. Louis 12, Mo.  
Est. 1857  
New York 6 • Chicago 7 • Birmingham 6  
Denver 3 • Houston 3 • Los Angeles 21  
San Francisco 7 • Portland 9 • Seattle 4

Schuller, assistant purchasing agent at Peoria, has been selected as purchasing agent for the Joliet operations. Otto F. Wiesemann, scheduling division manager in the production division of the manufacturing department, has been appointed production division manager at Joliet.

**Eriez Mfg. Co.**, Erie, Penn., has been appointed distributor for Radio Corp. of America electronic metal detectors and will handle all sales in the United States and Canada.

**Whiting Corp.**, Harvey, Ill., has acquired the belt and chain conveyor business formerly operated as the Curn-Foster Conveyor Co., Chicago, Ill.

**Hyster Co.**, Portland, Ore., has announced the appointment of Hal White, Jr., as purchasing engineer. For the past five years he has served in the sales promotion and advertising department and has also held various engineering positions.

**Round Associate Chain Companies**, Cleveland, Ohio, announces the organization of The Southern Chain & Mfg. Co., Birmingham, Ala., with general offices and plant-warehouse at 1224 Second Ave., North. The company will distribute products of other Round Associate companies.

**Mack Trucks, Inc.**, New York, N. Y., announces that A. F. Fenner, vice-president of Mack International Motor Truck Corp., has been named general sales manager, with headquarters

in Chicago, Ill. He will direct all truck, bus and fire apparatus sales and service activities in the Central, Southwestern and Pacific Coast divisions, as well as the Republic of Mexico. Mr. Fenner joined the company in 1915 as sales manager of the Albany, N. Y., branch.

**Allis-Chalmers Mfg. Co.**, Milwaukee, Wis., has announced the appointment of R. S. Stevenson as general



R. S. Stevenson

sales manager of the tractor division. He succeeds Marshall L. Noel who has resigned to accept a position as vice-president and treasurer of the Tractomotive Corp., Deerfield, Ill. Chester W. Schweers, manager of the Los Angeles district since 1947, has been named manager of the New England region with headquarters in Boston, Mass. He succeeds W. F. Taylor who has resigned. David W. Owens has been appointed sales representative in the New York district office.

Mr. Stevenson has been associated with the company since 1933 when he joined the Kansas City branch as a salesman. Two years later he became assistant manager of the branch at Omaha, Neb. In 1936 he was transferred to Milwaukee, Wis., as assistant southwest territory manager, and later was appointed manager of the northwest territory. In 1941, Mr. Stevenson was appointed southwest territory manager, remaining there until 1948 when he became assistant general sales manager.

Mr. Noel had spent more than 21 years with the tractor division. He was vice-president of the company and general sales manager of the tractor division when he resigned to join the Tractomotive Corp.

Mr. Schweers joined Allis-Chalmers in 1930 and served as a sales engineer in the New Orleans office for nearly 10 years before becoming manager of the Houston office in 1942.

Mr. Taylor, who had been associated with the company since 1926, and A. B. Frost, manager of the Boston district, who has also resigned, are establishing their own business. Mr. Frost had been with the company since 1937.

Mr. Owens has been connected with the crushing, cement and mining section of the company since 1947.

**Mack Trucks, Inc.**, New York, N. Y., has appointed E. G. Ewell, vice-president of Mack International Motor



Marshall L. Noel

## DIG-HAUL-DUMP



Sauerman Slackline Cableway moves gravel direct to screens from wet pit 100 ft. wide.

for a  
FEW  
PENNIES  
a yard!



Sauerman Scraper moves 54 tons an hour of sandstone from high bank to processing plant.

## Fast Handling at Lowest Cost

Time and labor are saved by using a Sauerman long range machine which combines digging and delivery of material in a continuous process with one operator.

For hauls up to 1,000 ft. in dry pits or banks or for stockpiling any kind of bulk material — use a Sauerman Power Scraper. For digging from a wet pit, river or lake — use a Sauerman Slackline Cableway. Rapid and dependable results at minimum cost. A few cents a cubic yard covers operating charges.

Write or wire for illustrated catalog.

## SAUERMAN BROS., Inc.

530 SO. CLINTON ST. CHICAGO 7, ILLINOIS

# STEEL

**Every Kind  
Quick Delivery**

**Plates, Structural,  
Bars, Sheets, Tubes, etc.  
Carbon, Alloy, Stainless  
Steels, Babbitt Metal.**

# RYERSON

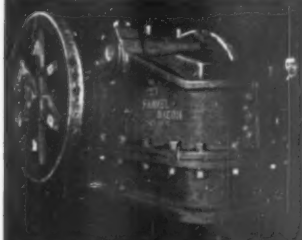
Joseph T. Ryerson & Son, Inc. Plants: New York, Boston, Philadelphia, Detroit, Cincinnati, Cleveland, Pittsburgh, Buffalo, Chicago, Milwaukee, St. Louis, Los Angeles, San Francisco

## New FARREL-BACON CRUSHER

has many advantages

Design features of this 36 x 30 E stone crusher include: (1) Meehanite frame, sectionalized when necessary; (2) removable water cooled bearings; (3) improved design of swing jaw bearing; (4) force-feed oil lubrication, or circulating system if desired; (5) split flywheels; (6) flat or V-belt drive.

Write for further details or engineering help. BA 1



**FARREL-BACON**  
ANSONIA, CONNECTICUT

Truck Corp., as general sales manager of the Eastern Atlantic and Southern sales divisions. Mr. Ewell has been associated with the company since 1924, when he joined the Charlotte, N. C., direct factory branch as a salesman.

The Dorr Co., Stamford, Conn., announces that William B. Gery, Anthony J. Fischer and Arthur Middleton, representing the sales, development and patent departments respectively, have returned from a flying trip to The Netherlands in connection with the company's handling of the world rights to the cyclone classification unit developed by the Dutch State Mines at Limburg, The Netherlands.

St. Marys Kraft Corp. and the Kraft Bag Corp., New York, N. Y., announce that the pulp and paper mill and the new conversion plant are now in full operation at St. Marys, Ga. The new bag factory manufactures heavy-duty, multi-wall shipping sacks for producers of cement, gypsum, lime, sand, gravel, clay, talc, and many types of crushed stone products. The mill converts slash pine into pulp, turns out Kraft paper for shipping sacks, wrapping and other paper products.

Federal Motor Truck Co., Detroit, Mich., has been awarded a safety flag by the Liberty Mutual Insurance Co., honoring employees and management for the year's outstanding safety program. It is the first time a truck manufacturer has received this flag.

John A. Roebbling's Sons Co., Trenton, N. J., has announced the appointment of Walter A. Huber as general manager of the wire rope division. Mr. Huber is a national figure in the wire rope industry. For the past nine years, he has served as manager of pre-formed wire rope sales for the American Chain and Cable, Inc., and prior to that had served as assistant to the president and sales manager of the wire rope division of the Jones & Laughlin Steel Corp. He has been secretary of the Wire Rope Institute for the past ten years.

Laclede-Christy Co., St. Louis, Mo., has announced that completion of its plant at Abbotsford, B. C., will result in price and freight saving advantages for Pacific Northwest users of the company's refractory products. A long-term agreement has been concluded by the Clayburn Co., Ltd., through which various qualities of fireclay brick, special hand-molded shapes and arch and wall tile will be made available to northwest purchases.

National Welding Equipment Co., San Francisco, Calif., announces the appointment of E. L. Mathy as sales and advertising counselor. Well known in industrial circles from coast to coast, Mr. Mathy personally developed and guided the sales promotional and advertising operations of the Victor Equipment Co., which he served as first vice-president and director for over 20 years.

## do 4 days' work in 3

with  
**JAEGER  
pressure**



125 ft. of 100 lb. air — Runs 2 heavy brackets or a heavy duty rock drill at full pressure.

15% to 20% more air @ 100 lbs. does 30% to 40% more work

It is important to you that, at full pressure, air tools hit enough harder and faster to do 30% to 40% more work than they do at the 70 lbs. pressure maintained by undersized compressors.

Jaeger "new standard" ratings (the first increase in the industry since 1932) give you the air you must have to run today's tools at proper pressure and efficiency—75 ft. of 100 lb. air instead of 60—125 ft. instead of 105—185 ft. instead of 160—250 ft. instead of 210—365 ft. instead of 315—600 ft. instead of 500. If this cost-saving interests you, send for Jaeger Catalog JC-8.

600 ft. of 100 lb. air — Runs 2 big wagon drills at full pressure, drilling 30% to 40% more footage than you can get with any 500 ft. compressor.

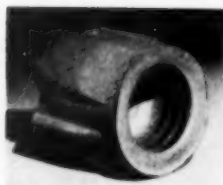


See your Jaeger distributor or write

**THE JAEGER MACHINE CO.**  
Columbus 16, Ohio Cable: BIGANULTE

**PUMPS • MIXERS • HOISTS • TOWERS  
TRUCK MIXERS • PAVING MACHINERY**





## TO AVOID THIS!

A carbide bit is no better than its thread . . . that's why you get the amazing cost-cutting advantages of carbide drilling only in Rok-Bits, with threads designed exclusively for carbide service. Rok-Bit threads are designed to give maximum bearing surface, are machined to minimum tolerances, thus



## Use TROUBLE-FREE ROK-BITS

insuring freedom from premature thread failure on both bit and steel. Write for folder and information about test. Rok Bit Sales & Service Co., 2514 East Cumberland St., Philadelphia 25, Pa. Branch: Asheville, N. C. A complete line of pneumatic tool accessories.



Better your footage with

# ROK-BITS

CROWN DESIGNED CARBIDES

PAT. PENDING

*New...* **BEAUMONT "BEAUCALLOY"**  
**BUCKET ELEVATOR CHAIN**



Beaumont "BEAUCALLOY" Chain cuts maintenance costs through great increase in service life. At present test installations these chains have been in operation more than twenty times longer than former malleable iron chain—and still show little sign of wear.

Besides utilizing Beaucalloy, a heat-treated alloy steel, Beaumont developed a new link design which provides additional metal on the barrel where wear occurs. In addition, the chain maintains almost steady contact during rotation on sprocket or traction wheel—reducing wear on barrel, pin and sprocket.

Write—without obligation—for data sheets or for our representative to call.



**Beaumont**

**BIRCH COMPANY**

1522 RACE STREET • PHILA. 2, PA.

DESIGNERS • MANUFACTURERS • ERECTORS • BULK MATERIAL HANDLING SYSTEMS

## Check These Features:

Barrel has extra metal on area receiving wear.

Projecting guards deflect material from chain joints.

Ground finish on pin reduces wear.

Special attachment permits use of new Beaumont Dove-Tail Lock buckets or conventional type "A" buckets.

## Financial

PENNSYLVANIA-LEXIE CEMENT CORP., New York, N. Y. reports for the years ended December 31 as follows:

	1949	1948
Earned per share	\$4.37	*\$5.13
Net sales	17,983,666	18,493,623
Total income	18,973,049	18,736,672
Profit after depr., int. etc.	4,141,566	4,349,827
Federal income taxes	1,510,000	1,644,000
Net profit	2,631,566	2,696,827
Dividends	1,041,820	755,989
Surplus	1,589,686	1,967,839
No. common shares	602,136	1526,008

\*Based on the 526,008 shares outstanding on December 15, 1948. Based on the 554,456 shares outstanding on December 31, 1948, including 28,448 shares issued as part of the purchase price of net assets of West Penn Cement Co., shares earnings for the full year 1948 would be \$4.86.

†Outstanding December 15, 1948.

PETOSKEY PORTLAND CEMENT CO., Petoskey, Mich., consolidated income account for the years ended December 31 as follows:

	1949	1948
Net sales	\$3,677,360	\$3,378,718
Cost of sales	2,599,470	2,528,758
Selling, etc., exp.	606,488	641,315
Operating profit	471,392	508,646
Other income	17,309	18,786
Total income	488,701	527,432
Interest	2,640	2,649
Federal income taxes	186,000	124,000
Pr. year inc. tax	67,635	—
Net income	300,696	200,792
Earn. surplus, 1-1	512,110	438,318
Dividends	125,000	125,000
Earn. surplus, 12-31	687,807	512,110
Earned per share	\$1.20	\$0.80
No. of shares	250,000	250,000

†After depreciation and depletion: 1949, \$112,021; 1948, \$108,134.

MEDUSA PORTLAND CEMENT CO., Cleveland, Ohio, consolidated income account for the years ended December 31 as follows:

	1949	1948
Net sales	\$16,144,843	\$13,156,214
Cost of sales	10,645,968	9,049,641
Selling, etc., exp.	1,767,482	1,579,872
Deprec. & deplet.	868,851	789,465
Operating profit	2,862,542	1,755,246
Other income	50,448	49,321
Total income	2,912,990	1,804,567
Interest	29,287	14,334
Can. exch. adj.	17,382	—
Other deductions	20,106	8,942
Federal income tax	1,951,000	643,706
Other inc. tax	61,000	49,800
Net profit	1,714,215	1,088,291
Surplus, Jan. 1	4,625,190	3,890,675
Common dividends	530,661	553,774
Surplus, Dec. 31	5,808,745	4,625,190
Earn., common share	89.69	86.15
No. of common shares	716,887	176,887

Note: Net profits of Canadian subsidiary included above, amounted to \$35,734 (1948, \$36,030).

The net profits for 1949 are the highest reported since 1928. J. B. John, president, predicted that business volume in 1950 would compare favorably.

NORTHWESTERN STATES PORTLAND CEMENT CO., Mason City, Iowa, has presented the following account of income for years ended November 30:

	1949	1948
Net before taxes	\$1,970,067	\$1,152,119
Income taxes	410,191	441,566
Net income	659,876	711,553
Prev. earn. surp.	1,428,309	1,112,610
Dividends	397,316	397,316
Reserve adjust.	53,730	1,463
Earn. surp., 11-30	1,744,599	1,428,309
Earned per share	\$3.32	\$3.58
Number of shares	198,658	198,658

UNITED STATES GYPSUM CO., Chicago, Ill., and subsidiaries net profit.

for the first nine months of the year 1949, amounted to \$16,100,252 as compared with \$18,667,009 for the same period of 1948. Net profit is equal to \$9.81 a common share as compared to \$11.24 for the same type of share the year before. Sales for 1949 totaled \$101,616,681 contrasted to \$109,575,120 in 1948.

GLENS FALLS PORTLAND CEMENT Co., Glens Falls, N. Y., income account for the years ended December 31 is as follows:

	1949	1948
Net sales	\$3,983,720	\$3,483,187
Mfg., etc., expense	3,047,815	2,748,554
Depreciation	107,173	106,251
Operating profit	828,733	628,382
Other income	3,795	1,720
Total income	832,527	630,102
Bond int., etc.		5,833
Federal income tax	317,000	236,000
Net income	515,527	388,269
Surplus, 1-1	1,195,053	914,284
Prof. divs.	6,000	6,000
Common divs.	201,950	101,500
Surplus, 12-31	1,502,630	1,195,053
Earned pref. share	\$515.53	\$388.27
Earn., common share	12.64	9.41
No. of pref. shares	1,000	1,000
No. of common shares	40,300	40,600

ARUNDEL CORP., Baltimore, Md., income account for the years ended December 31 is as follows:

	1949	1948
Net sales:		
Contr. billings	\$5,428,504	\$7,323,473
Commodity	4,573,646	4,519,553
Mar. rent, etc.	111,626	173,075
Total	10,113,776	12,016,101
Oper. expenses	8,936,308	11,648,862
Balance	1,177,468	370,239
*Joint vent. inc.	817,144	336,981
Net earnings	1,995,112	707,220
Adm. & gen. exp.	817,610	706,928
Operating inc.	1,177,503	295
Dividend income	163,247	173,882
Other income	132,508	141,334
Total income	1,473,558	319,561
Int. & debt exp.	52,882	44,075
Contract loss res.		100,000
Federal income tax	388,000	33,000
Insur. recovery		*cr 381,511
Net income	1,035,676	519,997
Earn. surplus, 1-1	4,073,540	3,791,892
Dividends	547,836	438,349
Contingency res.		cr 200,000
Earn. surplus, 12-31	4,561,280	4,073,540
Earned per share	\$2.36	\$1.19
Number of shares	438,876	438,376

\*Including sales to affiliated company: 1949, \$1,419,317; 1948, \$1,238,174.  
†After depreciation and depletion: 1949, \$191,888; 1948, \$516,666.

\*Includes dividend received from incorporated venture: 1949, \$125,000; 1948, \$100,000.  
\*After deducting \$127,000 portion of Federal income taxes applicable thereto.

NORTH AMERICAN CEMENT CORP., New York, N. Y., income account for the years ended December 31 is as follows:

	1949	1948
Net sales	\$9,740,679	\$8,645,112
Cost of sales	6,744,247	6,045,780
Selling, etc., exp.	855,340	860,942
Other profit	2,011,092	1,738,390
Misc. income, net	29,553	22,749
Total income	2,040,645	1,761,139
Interest, etc.	136,239	102,272
Deprec. & deplet.	401,361	356,880
Federal income tax	570,000	500,000
Net income	938,045	802,387
Other deficit, 1-1	976,800	1,806,864
Loss plant sold	1418,724	
Pr. years income tax	100,000	
Bond premium	17,164	
Credits	8,737	27,677
Oper. def., 12-31	570,906	876,800
*Times chg. earn.	12.03	13.73
Earn. pr. pref. share	86.29	\$5.41
Earn., pref. share	365.34	306.20
*Earn. cl. A com. share	33.50	26.59
No. pr. pref. shares	148,426	148,426
No. of pref. shares	1,651	1,651
No. cl. A com. shares	18,891	18,891

\*Before Federal income taxes.  
†After deducting \$282,000 Federal income taxes.  
\*Disregarding preferred arrears.

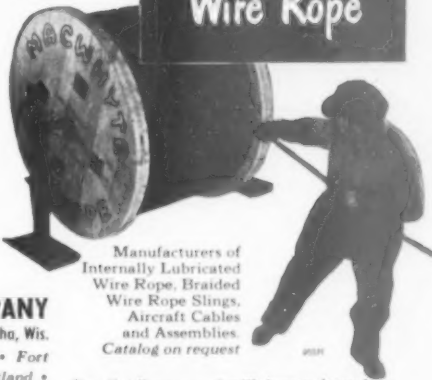
## There's a Macwhyte Rope that's the right rope for your equipment

All job proved - - a thousand and one wire ropes to choose from

For easy handling and longer service use PREformed Whyte Strand Wire Rope - it's internally lubricated

Ask a Macwhyte representative to recommend the rope best suited for your equipment.

## Macwhyte Wire Rope



Manufacturers of Internally Lubricated Wire Rope, Braided Wire Rope Slings, Aircraft Cables and Assemblies. Catalog on request.

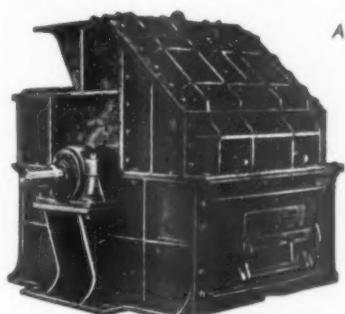
### MACWHYTE COMPANY

2949 Fourteenth Avenue, Kenosha, Wis.

Mill depots • New York • Fort Worth • Pittsburgh • Portland • Chicago • Seattle • Minneapolis • San Francisco • Los Angeles

Our distributors and mill depots throughout the U. S. A. and other countries carry stocks for immediate delivery.

## WHAT'S THE SIZE OF YOUR CRUSHING JOB?



Americans offer the action and the capacity you need.

For heavy-duty reduction of one-man size to roadstone or agstone, American Hammermills are available in 3 sizes - up to 250 TPH.  
• CENTER FEED models produce a higher ratio of fines through longer travel of stone in hammer cycle.  
• FRONT FEED models minimize fines.

American "ACS" Sizes up to 250 TPH

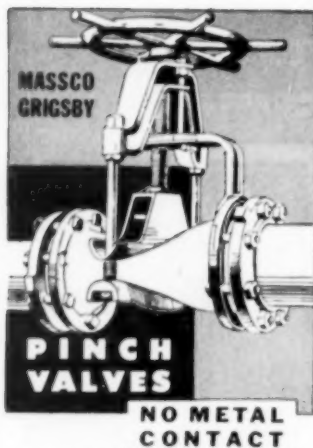


American "24" Sizes up to 50 TPH



American "30" Sizes up to 100 TPH

Send for "Better Stone Crushing" Booklet  
**American PULVERIZER COMPANY**  
Originators and Manufacturers of Ring Crushers and Pulverizers  
1245 MACKLIND AVE.  
St. Louis 10, Mo.



**NO METAL CONTACT**

Recommended for transporting abrasive and/or corrosive pulps and liquids, where severe wear makes replacement of metal valves too costly. Rubber or synthetic sleeve closes tight even on solid particles. No packing glands, not affected by freezing or scale formation. Sizes: 1", 2", 3", 4", 6", 8", 10" and 12" dia.

**MINE & SMELTER SUPPLY COMPANY**  
Denver Salt Lake City El Paso  
1775 Broadway, New York

## By-Product Slag from Iron and Steel Industry

BUREAU OF MINES reports that during 1947, when 32,284,000 tons of slag were produced as a by-product of the iron and steel industry in this country, approximately 19,582,000 tons, or about 61 percent, valued at nearly \$19,526,000 were used commercially, the major tonnages going into highway construction and railroad ballast. Of the total produced in 1947, 27 percent was used in roads and streets other than in concrete and bituminous work, 22 percent was in bituminous construction, and railroads used 21 percent for ballast. Nine percent was used in concrete block and other concrete products, eight percent in portland cement-concrete construction, 5 percent in cement manufacture, 2 percent for roofing materials, and 6 percent for other purposes.

Number	Name
2,348,715	Adams et al.
2,306,352	Burrell
2,242,837	Shields
2,184,952	Zimmer et al.
2,175,491	Stresen-Reuter et al.
1,620,101	Wilkin
1,365,134	Morgan
2,266,325	Lazar et al.
2,367,462	Farber

Foreign patents are as follows:

Number	Country	Date
502,335	Great Britain	Mar. 15, 1939
681,855	Germany	Oct. 3, 1939
111,339	Australia	Sept. 15, 1940

In the United States, a total of 62 plants for processing iron blast-furnace slag produce four general types of commercial slag: screened air-cooled, used chiefly as aggregate and for railroad ballast; unscreened air-cooled, employed principally in base courses for roads and as a fill material; granulated slag, for filling purposes, in highway pavement base courses, and in the manufacture of cement; and lightweight slag, used in molded concrete products.

## Research

(Continued from page 83)

Other oil companies, such as the Texas Co., also have been active in promoting the use of rust inhibiting oils.

Other United States patents that could be used as references on rust prevention are:

Date

May 16, 1944

Dec. 22, 1942

May 20, 1941

Dec. 26, 1939

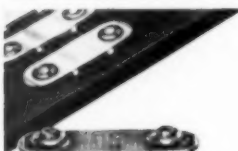
Oct. 10, 1939

May 24, 1927

Jan. 4, 1921

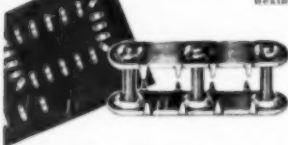
Dec. 16, 1941

Jan. 16, 1945



## ARMSTRONG - BRAY Heavy Duty Conveyor Belt Fasteners

PLATEGRIP Belt Plates permanently join the ends of heavy conveyor belts. Applied manually anywhere to belts up to 1 1/2" thickness, and of any width, they make a smooth, flush, flexible and dust-tight joint.



PLATEGRIP Repair Plates make it possible to repair rips or insert patches in worn belts.



Hinged Strap Fasteners No. 500 make a strong flexible joint that can be parted by pulling out hinge pin. — permit easy adding-on or removal of belt sections (as to extend or shorten belt).

Write for Plategrip and Hinge Plate Circulars.

**ARMSTRONG-BRAY & CO.**  
3386 Northwest Hwy., Chicago 30, Ill.



## Make Your Screening Operation Efficient

## with LINK-BELT "CA"

## Vibrating Screen

The Concentric Action vibrating screen, with its two-bearing vibrator imparting a positive circular motion to all screening surfaces, is ideal for both medium and heavy-duty sizing of a large variety of materials, as well as for scalping.

It has extreme smoothness in starting and stopping; superior efficiency on overloads; large amplitude at high speeds; unobstructed screening surface. Easily inspected, serviced and adjusted.

## LINK-BELT COMPANY

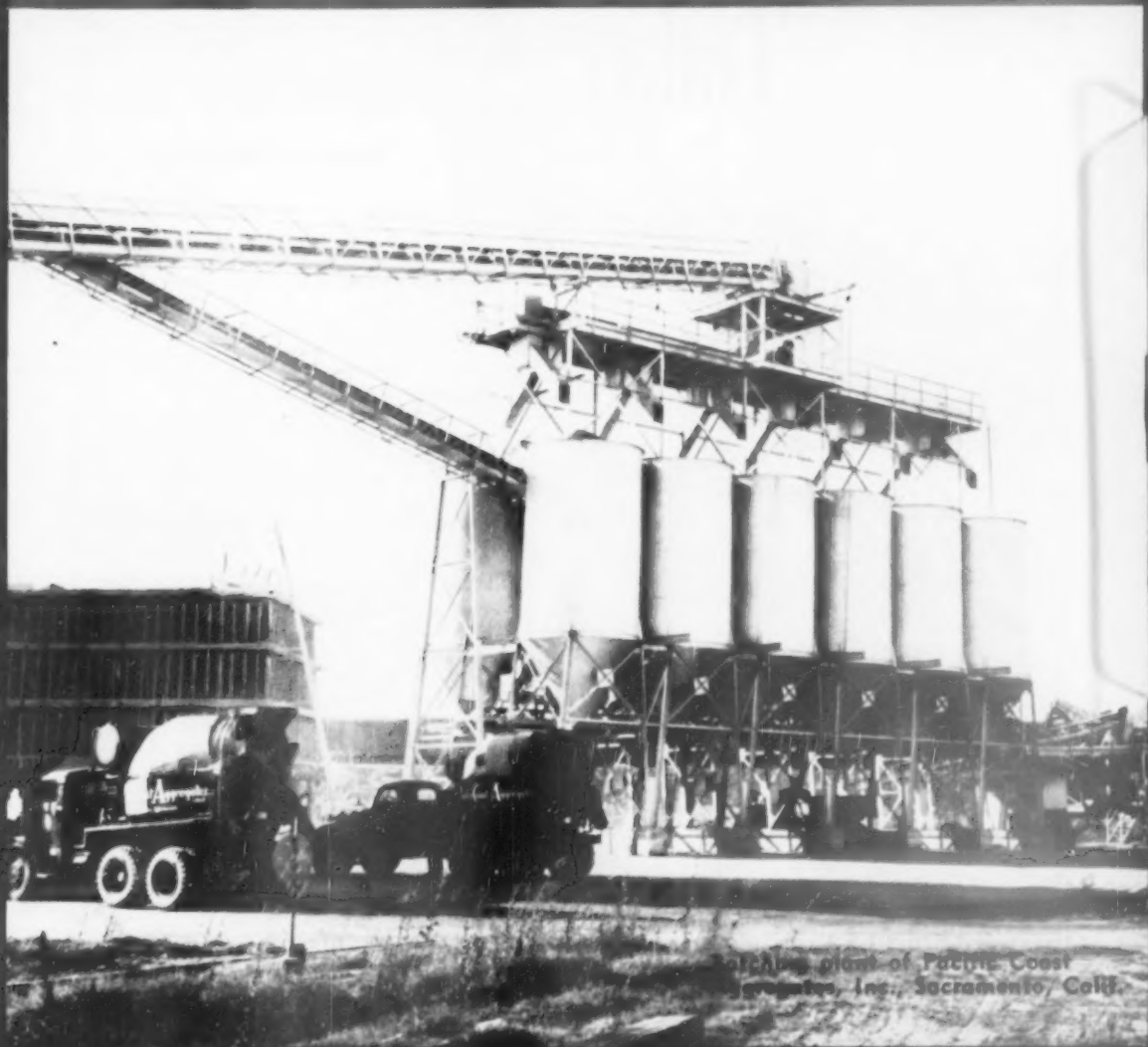
Philadelphia 40, Chicago 9, Indianapolis 5, Atlanta, Houston 1, Minneapolis 5, San Francisco 24, Los Angeles 33, Seattle 4, Toronto 8. Offices in Principal Cities.

Write for Book 2154 giving full details.

# CONCRETE PRODUCTS

A SECTION OF ROCK PRODUCTS

CONCRETE UNITS · READY-MIXED CONCRETE



Richmond plant of Pacific Coast  
Concrete, Inc., Sacramento, Calif.



## Ten Years Ago...

this test paving was laid in Minneapolis—the first commercial use of Atlas Duraplastic air-entraining cement. Badly scaled background section was made with regular cement. Foreground concrete was laid at the same time with Duraplastic. Here are both sections, photographed in July 1949, after ten severe winters, heavy applications of de-icing salts—convincing proof of durability, lasting good appearance of Duraplastic. Longitudinal structural crack shows some raveling. Note perfect transverse joint.



## Today . . . . Manufacturers rely on **DURAPLASTIC\***

for superior concrete products



More and more products makers, noting the growing acceptance of Atlas Duraplastic air-entraining portland cement for paving and structural work, have come to rely on Duraplastic for superior concrete products at no extra cost. They use it for concrete pipe, block, brick, drain tile, silo staves and other products.

Today, for machine-made products, like the pipe shown here, manufacturers find they can use a damper mix—one that's more cohesive, holds together better and feeds easily through machines. Finished units exhibit greater resistance to passage and absorption of water. Appearance and face-texture are generally improved. Edges and corners are clean-cut, truer.

Atlas Duraplastic complies with ASTM and Federal Specifications, calls for no unusual changes in procedure and costs no more than regular cement.

**Send for free new booklet, "A Decade of Atlas Duraplastic Air-Entraining Portland Cement."** Write to Universal Atlas Cement Company (United States Steel Corporation Subsidiary), Chrysler Building, New York 17, N. Y.

*"Duraplastic" is the registered trade mark of the air-entraining portland cement manufactured by Universal Atlas Cement Company.*

OFFICES: Albany, Birmingham, Boston, Chicago, Dayton, Kansas City, Minneapolis, New York, Phila., Pittsburgh, St. Louis, Waco.

# ATLAS DURAPLASTIC

AIR-ENTRAINING PORTLAND CEMENT

**MAKES SUPERIOR CONCRETE PRODUCTS AT NO EXTRA COST**

TRADE MARK REG.  
U. S. P. O.



"THE THEATRE GUILD ON THE AIR"—Sponsored by U. S. Steel Subsidiaries—Sunday Evenings—NBC Network



# INDUSTRY NEWS

## North Carolina Masonry Group Meets

SPRING MEETING of the North Carolina Concrete Masonry Association was held in Salisbury, N. C. March 22, at the Country Club. Johnson Concrete Co., of that city, acted as host to the nearly 50 members and guests from throughout North Carolina and nearby states. Following a business meeting, at which association policies and advertising for the coming year were discussed, Reid W. Hyde, The Sintering Machinery Corp., Netcong, N. Y., spoke on "Sintering Machinery and Its Product." After a Dutch steak luncheon, an inspection trip to the sintered lightweight aggregate plant being erected by Johnson Concrete Co., the first such plant in the Southeast, was held. The Summer meeting of the Association will be held in Wilson, N. C., May 24.

## Transit Mix Plant

LAWTON TRANSIT MIX, INC., Lawton, Okla., has been established, with Andy Crosby, Jr., Thomas H. Lewis, Jr., M. R. Amerman and R. H. Baldwin as incorporators, to produce all types of ready-mixed concrete and distribute cement, sand and rock on a retail basis.

The \$50,000 business is beginning operation with a concrete batching plant plus a 15 x 30-ft. warehouse, and office building and two 3-cu. yd. ready-mixed concrete trucks. The plant affords storage bins accommodating two

carloads of cement, an aggregate hopper, crane and cement elevator. Arrangements are being made for a railroad spur to the plant, according to the firm.

## Cover Picture

THE DISTRIBUTION PLANT of Pacific Coast Aggregates, Inc., Sacramento, Calif., consists of 12 conical-bottomed steel silos arranged in two parallel rows. Each silo holds 120 tons of material. The belts are used to reclaim materials for the ready-mixed concrete plant adjoining the structure, or for transferring material from one silo to another.

## Concrete Joist Plant

MAY SAND & GRAVEL CORP., Fort Wayne, Ind., property is the site leased for a new plant which will manufacture a precast concrete beam by the "Clorflor" process. The \$100,000 plant is expected to be in production the latter part of June. The firm has acquired patent rights to the Clorflor process for that territory from the Permacrete Products Corp., Columbus, Ohio.

SOUTH SIDE CONCRETE, INC., St. Louis, Mo., is erecting a new \$50,000 ready-mixed concrete plant at Highway 66 and Grant road. The plant will be completely mechanized and have a daily capacity of 600 cu. yd. The firm is headed by John M. Mohan.

HOLTOP CONCRETE PRODUCTS, Ferrysburg, Mich., recently displayed its products in Grand Haven as the 37th in a series of educational exhibits being sponsored by the Grand Haven employers' committee for economic development. The project is being sponsored so that the public may be better informed on the products of North Ottawa factories and on the activities of organizations.

KANSAS-MISSOURI SILO CO., INC., Topeka, Kan., has been organized to produce and deal in concrete products, including silos, grain bins, grain elevators, building block, stock tanks, dairy barns, chicken houses, stepping stones and septic tanks. Capital was listed at \$10,000. J. Clyde Lentz, Harman R. Brown and Hartzell Burton are the incorporators.

CONCRETE MIX, INC., has been organized at Rockingham, N. C., to produce ready-mixed concrete. Authorized capital stock is listed at \$100,000; subscribed stock at \$9000. W. R. Jones, Jr., C. A. Gillis and Walter Hampsey are the incorporators.

SOUTH END BUILDING MATERIALS Co., Houston, Texas, is constructing a building materials and ready-mixed concrete plant in that city at a cost of over \$100,000, according to Lawrence F. Fuqua, president of the firm. A 2500-ft. spur track is being built off the G., H. and H. Railroad. Bins are being fabricated by Butler Bin Co.

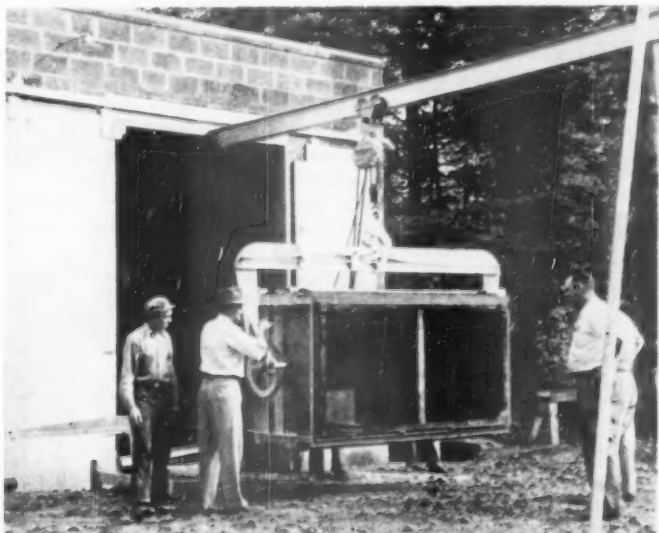
FITHIAN CEMENT PRODUCTS Co., East Liverpool, Ohio, has started the manufacture of lightweight prefabricated concrete steps for homes and commercial buildings. The units will be sold through the firm's Youngstown plant, and consist of side walls, steps and risers, all fabricated as separate units.

BARGAIN SUPPLIES, Sandpoint, Idaho, has established a \$50,000 transit-mixed concrete plant. Two Willard truck mixers are used for deliveries. The company uses both local and Spokane aggregate.

THORN LUMBER Co., Martinsburg, W. Va., has begun production of transit-mixed concrete. The company uses two 3-cu. yd. high-dump trucks for delivery.

NORMAN WITHEY & Co., Inc., Madison, Wis., is precasting wall sections for the construction of its own plant at Madison, where they plan, when their plant is completed, to put their product into production for sale. The Withey firm will make wall sections to order with the windows and doors cast in place for building contractors.

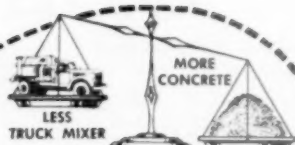
ROCKLITE PRODUCTS, Ventura, Calif., has announced the appointment of Consolidated Rock Products Co., Los Angeles, as its sales representative for that area. The Rocklite products are lightweight masonry units, lightweight structural concrete aggregate, and lightweight ready-mixed concrete.



A concrete septic tank and form weighing more than 3000 lb. is manipulated by this device suspended from a traveling electric hoist at the plant of Bookout Brothers, Fairfax, Va. The Automatic Gripping Turner, made by Carpenter Manufacturing Co., is lowered over half of a tank, raised, and turned over by means of a crane.

Now - with these New  
**LOAD LIMIT**

SMITH-MOBILES, You Can  
Haul BIGGER PAYLOADS



... without Exceeding  
Highway Weight Limits!

Your Smith-Mobile **LOAD LIMIT** Model can easily be converted to a Standard Smith-Mobile Truck Mixer or Agitator. A Standard Model can easily be converted to **LOAD LIMIT** Model.

Wouldn't you like to have your trucks haul more concrete and less mixer with a lower capital investment? You can do it with these new Smith-Mobile Load Limit Models. Deadweight is reduced to a minimum by eliminating parts and assemblies not necessary to mixer operation. This means you can haul full-rated truck mixer payloads and still meet highway load limitations. And you can do it without any compromise with quality, performance or sturdiness. Smith-Mobile is the **ONLY** Load Limit truck mixer carrying the approved NRMCA rating plate. Models are available in 2, 3, 4½ and 5½ yard sizes, with higher ratings for agitators. Get the complete story. Ask for Bulletin No. 247.

Copyright, 1950 by T. L. S. Co.

THE T. L. SMITH COMPANY  
2885 N. 32nd St. • Milwaukee 10, Wisconsin, U. S. A.

# SMITH MOBILE

Our 50th Anniversary - A HALF CENTURY OF PROGRESS BUILDING BETTER MIXERS!

1900

1950

A 5707-1P

# *It pays.....*

to modernize your plant... and  
here's the block machine to do it!

## Appley-Yellen Assures You HIGH Output with LOW Investment Cost!

**Economical** Low maintenance and operating cost. Uses low air pressure (80-100 lbs. per sq. in.). Made to jigs and fixtures, each the same. All parts interchangeable...wearing parts few!

**Efficient** Auto-controlled. 3,500-block output per day with minimum crew! All blocks uniform, true-sided...low rejects and spoilage.

### **Simple to Operate**

Finger-tip controls; three operating levers only. Few moving parts. Easily changed for each type of aggregate.

### **Rugged**

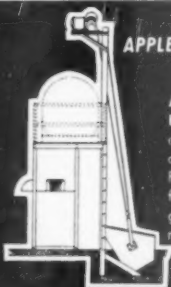
Designed and constructed for heavy-duty operation. No high-pressure parts!

### **Versatile**

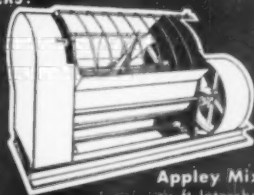
Fits into your present operational procedure. Manufactures all types of blocks from one core box equipped with quickly interchangeable cores.



### APPLEY-YELLEN ALSO OFFERS:



**Appley Skip Hoist** — sturdy, dependable. Fast, accurate loading. For 14 or 28 cu. ft. mixer — on ground or above machine.



**Appley Mixer** — 14 or 28 cu. ft. Interchangeable lining. Rubber-covered blades.

**Appley Little Giant Slump Block Machine** — efficient, economical hand-operated.



MISHCO CORPORATION \* 615 S. W. 2nd AVENUE \* MIAMI, FLORIDA  
J. W. APPLEY & SON, INC. \*\*\* ST. PETERSBURG 2, FLORIDA

CONCRETE PRODUCTS, May, 1950  
A Section of ROCK PRODUCTS

# TON OF DUMPTOR STRENGTH

ASK TOO ABOUT KOEHRING HEAVY-DUTY  $\frac{1}{2}$ ,  $\frac{3}{4}$ ,  $1\frac{1}{2}$ ,  $2\frac{1}{2}$ -YD. EXCAVATORS

for every  
ton of  
payload



Write for illustrated bulletin on new  $2\frac{1}{2}$  yard Koehring 1005 Shovel.

## Dumptors\*

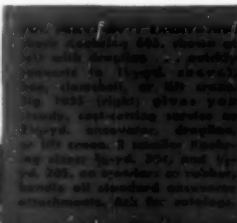
stand up under the severest shocks of shovel-loading  $1\frac{1}{2}$  to  $2\frac{1}{2}$  yards of rock at a pass because they're built extra tough for rock handling. There's more than a ton of net vehicle weight for every ton of payload.

All-welded body sides, ends and bottoms are heavily reinforced with 4" channel ribs. More than triple strength has been built into the bottom . . . seasoned  $1\frac{1}{2}$ " oak timbers are securely bolted between two layers of  $5/16$ " steel plate. Steel-oak-steel construction cushions shocks of rock loading. Free-swinging, kick-out pan adds an-

other tough  $3/16$ " high-manganese steel plate for extra protection. Dumptor also has: rugged main frame, 8" ship-channels, heavily trussed . . . one-piece steel drive-axle housing and transmission case . . . 4" chrome steel drive axles . . . cast alloy steel "I" beam steering axle. All add extra strength to Dumptor chassis.

Heavy-duty construction like this assures you that Koehring Dumptors will stand up under your toughest assignments . . . that there will be little down time with Dumptors on your job. For complete facts, see your Koehring distributor today.

\*TRADEMARK REG. U. S. PAT. OFF.



# KOEHRING

## COMPANY

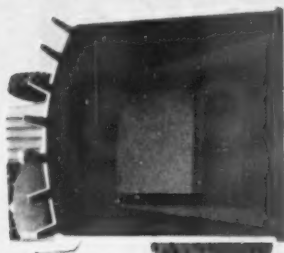
MILWAUKEE 10, WISCONSIN

SUBSIDIARIES KWIK-MIX • PARSONS • JOHNSON



### DUMPTOR BODY HEAVILY REINFORCED

All-welded sides, ends and bottom of heavy-duty 6-yard Dumptor body are heavily ribbed with 4" channels. High-carbon steel gives extra strength and protection at stress points...where the abrasive action of rock handling is most severe.



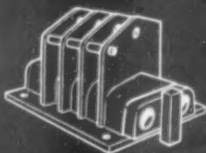
**KICK-OUT PAN** adds an extra 3/16" high-manganese steel plate on top of sturdy Dumptor bottom... breaks suction of sticky materials for fast, clean dump. Big 8' x 8' top gives easy-to-hit target for fast loading over the side or end with less spillage.



### 1 SECOND GRAVITY DUMP

Operator trips body release lever... gravity instantly tilts scoop-shaped body. One second later, load is out and Dumptor is off for another load. No slow-moving body hoists... no body hoist maintenance.

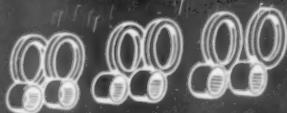
## Faster Operation for EXTRA TONNAGE



**FASTER OPERATION** because heavy-duty 6-yard body is made of high-carbon steel to maintain natural shape alignment.



**FASTER OPERATION** because double-lip construction gets big loads with fast closing in any material.



**FASTER OPERATION** because sealed needle bearings on closing sheaves eliminate friction.



**FASTER OPERATION** because all-welded dome, smooth inside and out, dig and dump with less resistance.

# THE C. S. JOHNSON COMPANY

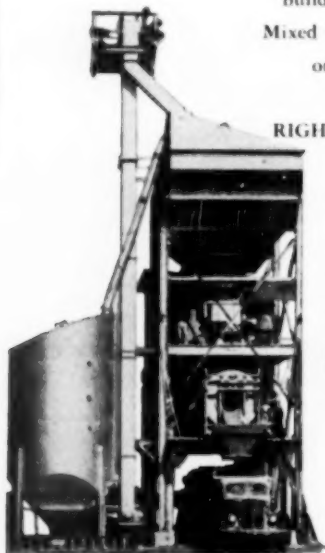
KOEHRING SUBSIDIARY, CHAMPAIGN, ILLINOIS





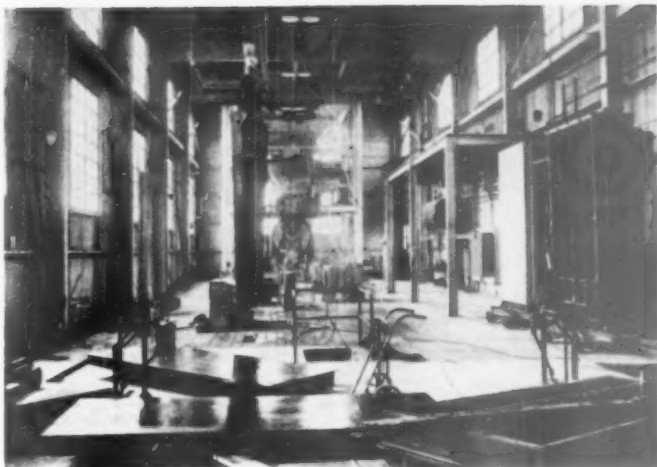
Lines that come from the BUTLER Engineer's drafting pen are much more than space dimensions. They represent ingenious solutions to problems of terrain, material storage and material flow. They designate the most efficient traffic movement for workers and vehicles. They point the way to highly automatic operations that drastically cut labor costs, that reach new standards of fast production and greater profits to the owner.

So, whether it's to be a Road builder's Plant, — a Ready Mixed Concrete installation, or a Concrete Products Plant — for the RIGHT solution call in the BUTLER Engineer.



989 Blackstone Ave.  
Waukesha, Wisconsin

**Precast Building Sections, Inc., produces standard wall panels of large size; efficient methods used to produce one section every 14 minutes**



By **NORMAN D. NICHOLS**

Interior of plant showing bins, mixer, scales and water motor in background; credles containing hydraulic retractable cores and jacket being carried on monorail, center; and, in foreground, stripped slab and slab within jacket at right on dollies, and exposed interior of steel side forms in front

## MANUFACTURE OF PRECAST WALL SECTIONS

**E**VER SINCE simple machines were used in the construction of the pyramids, the practical and ingenious adaptation of machines for construction purposes has been noted and improved upon. Such a utilization of machines, worthy of notice, is found in the process being used by Precast Building Sections, Inc., New York, N. Y., to manufacture and erect giant-size wall panels for single or multi-story buildings in the greater New York City area.

During the process, the wall panels are cast, handled, transported and erected in the same position in which they are to be placed under stress in the building. These building sections average 40 sq. ft. in area, weigh about 1500 lb., and have a surface finish similar to the more expensive cut stones. Stainless steel sheets have been cast as a facing and minor form changes will allow the use of this section shortly. The slabs are made at the rate of one each fourteen minutes.

### Application

The precast building sections are giant-size slabs, made 8-in. thick, in modular widths and to specified story heights (up to 10 ft.) to form the exterior walls of a structure as a complete wall unit. Only paint is required for interior finish. Reinforced concrete or structural steel frames sup-

port the slabs in tall buildings, and in single story structures the slabs carry the load. The large surface area has long been desired by many designers, particularly in recent years when the modern treatment became popular.

The design process is simplified so that the architect or engineer may select the modular widths to conform with the desired fenestration. Some special shapes are anticipated as required by contract—a precast pilaster may be desirable, and possibly contrasting materials and colors would be involved.

The great reduction in the number

of masonry joints, so often a cause for worry, is desirable to the owner and designer. Speedy erection saves many manhours at the site as the wall is complete when set and requires only paint for decoration. This cavity wall makes erection possible under most unfavorable winter conditions. The use of these slabs is limited only by the economic use of a gasoline-powered light crane, for erection on the small job.

### History

Precast building sections were invented, improved, designed and produced for architects and engineers by an architect. For nearly 50 years, Grosvenor Atterbury, F.A.I.A., has carried on research and, from time to time, has constructed sizable building projects utilizing the giant-size sections.

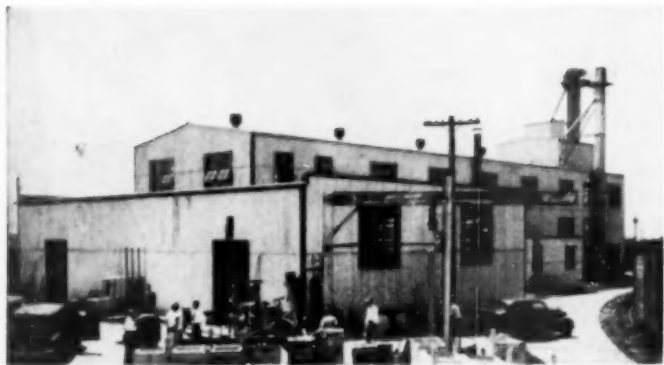
In 1904, Mr. Atterbury studied the use of mass-produced concrete units for low cost workmen's homes. The re-use of a standard mold reduced the cost of forming concrete to achieve that goal. Thus, it is noted that modular design is not relatively new.

By 1910, Mr. Atterbury had arrived at a standard size unit compatible with economic duplication and handling, and the first structures were erected at Forest Hills, N. Y. During the next ten years, some forty houses and apartment buildings were constructed there, and practically the en-



The author

\*Precast Building Sections, Inc., New York, N. Y.



General view of plant exterior

tire construction was of precast units, including floors, roofs and stairs, as well as the walls. These houses are still standing and are in good condition.

During the winter of 1944-45, Mr. Atterbury planned and supervised the casting and erection of precast building sections for a central service building at Tilton General Hospital, Fort Dix, N. J. Since the war, his efforts resulted in the planning and completion of the factory for the mass production of these units under controls seldom found in the most meticulous laboratories.

Early units were made using collapsible cores; today, cores are hydraulically retracted. Early sections required the single use of the mold for 24 hr.; today, the mold, a part of a machine, is required for only 90 min. Numerous experiments, including the use of high early strength cement, the addition of calcium chloride, the use of air-entraining agents and the application of heat, produced results that permitted the time reduction and minimized the investment in molds and other apparatus. Early units used heavyweight aggregates; today, lightweight aggregates are used for weight reduction and lower transmission of heat or cold coefficients.

One of the recent improvements in the process was the adoption of a mechanism to squeeze the concrete during the early hardening period. This squeezing anticipates the subsequent shrinkage stresses in the concrete by compressing the expanded mass during its change from a liquid to solid state, assuring freedom from cracks. As shown in Fig. 1, a restraining or closure plate is secured to the retractable cores and is held in contact with the freshly placed concrete. By progressively lowering the cores a fraction of an inch, a pressure of approximately 50 p.s.i. is maintained during the hardening period. Currently the manufacturing process is being adapted so that stainless steel or aluminum sheets and forms may be incorporated as an exterior surface finish. Patent coverage has kept pace with development.

### Processing Procedure

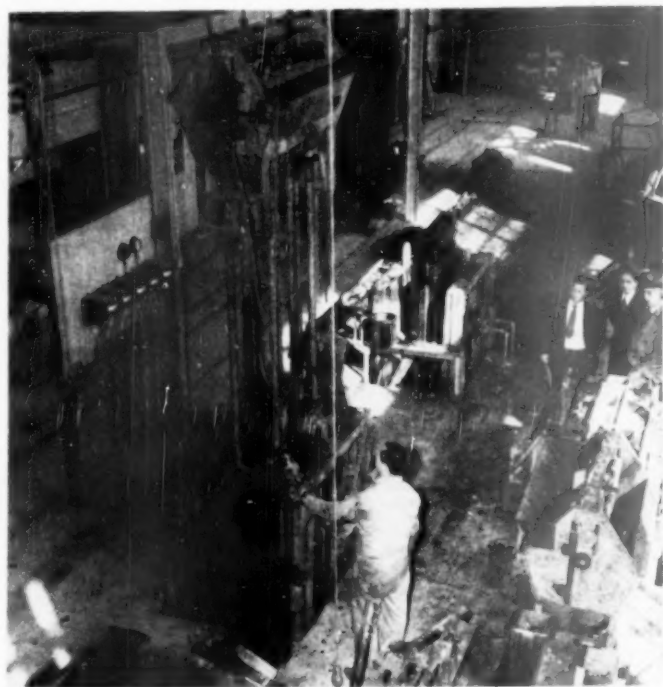
The manufacturing operations consist of assembling the outer form, or jacket, with its pallet; placing the jacket in the cradle; placing the concrete using the hopper with its tremie tubes; applying heat and pressure at the cores; removing the jacket containing the casting; stripping the jacket; removing the casting to the curing room and transferring the slab to storage for shipment (Fig. 2). All slabs are cast, handled, stored and shipped in a vertical position.

The "jacket" is a patented form consisting of two steel sides and ends

that lock into a steel pallet. The assembly of these five-form sections is accomplished with the use of a special lifting and control unit carried on a manually operated electric hoist traveling on a system of overhead rails extending to all parts of the factory. This hoist carries the jacket assembly to the "cradle." The pallet in the jacket has openings that allow the assembly to slide over the cores of the cradle.

The 10-ft. deep cradle consists, principally, of two parallel connected steel frames, to furnish bracing for the jacket during the casting operation, and is designed to resist all casting pressures. From the bottom of the cradle, partially retractable, tapered steel cores, 10 ft. long, extend vertically to provide the void spaces. These cores contain steam coils which provide heat to accelerate the rate of hardening of the concrete. When the jacket is lowered into the cradle and secured, the concrete is brought from the mixer in the hopper assembly.

The hopper consists of an open-top container from which extend either six or eight metal tremie tubes having valve controls to regulate the flow of the mixture into the forms. The tubes are lowered into the form, the valves are opened, the concrete flows and, as the plastic mix rises, the tubes are slowly raised, maintaining a hydraulic head pressure until the concrete reaches the top of the form. The hop-



Tremie tubes attached to base of loader hopper are being lowered into forms. Black steel forms are held in place by cradle extending below floor level

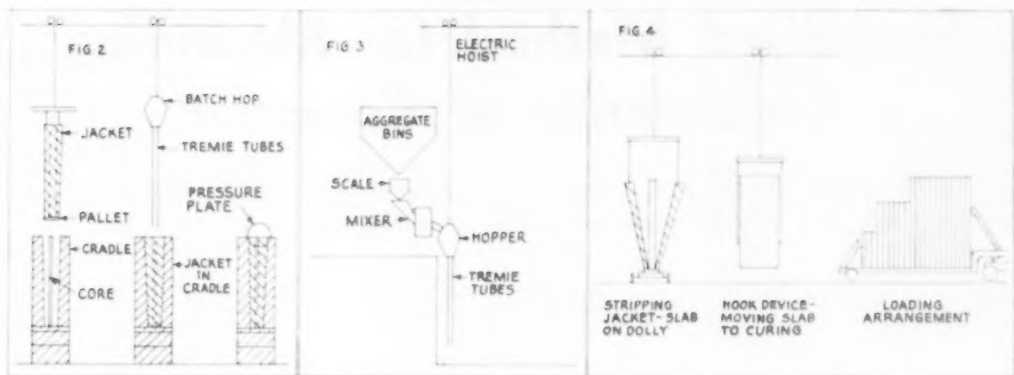


Fig. 2: Casting operation. Fig. 3: Arrangement for mixing and batching transfer. Fig. 4: Stripping jacket, slab on dolly; hook device, moving slab to curing, and loading arrangement

per and tube assembly are removed for cleaning. A cover plate is fastened to the top of the cores and the cores are lowered one inch, thereby placing the concrete mixture under compression during the setting period, to offset shrinkage stresses.

When the concrete has set sufficiently, the cover plate is removed, the cores are lowered and the jacket assembly containing the casting is raised and placed on a dolly car preparatory to stripping and transfer to the curing room. Cradles, cores and jacket are cleaned and prepared for the next cycle.

### Mixing

A conventional arrangement of bins, scales and mixer are used to mix the concrete which is designed for a minimum seven day compressive strength of 3000 p.s.i. (Fig. 3). High early strength cement, expanded slag, an air-entraining agent and a small amount of fine sand make up the batch, to which hot water is added. Practical laboratory control is assured as the aggregates are carefully weighed and the liquids measured by meters. The moisture content of the aggregates is periodically checked. Casting in forms that are in a vertical position to produce slabs having a face shell thickness of 1½ in., necessitated designing a mix having an unusually high slump. Quantities of cement and aggregates are so balanced that the requisite workability strengths are obtained with a minimum cement content.

Approximately 80 to 90 minutes after the concrete has been deposited in the jacket, the slab is strong enough to be handled by a special set of hooks, shaped much like ice tongs, that engage holes in the end webs for movement to the curing room. This handling of an unreinforced slab attests to the quality of the concrete produced. The operation of five cradle units is synchronized to permit the removal of a complete slab to the curing room every fourteen minutes.

### Curing and Cutting

The finished slabs are stored in the curing room, where they are uniformly spaced to allow the water vapor to control the continued hydration of the cement, with its gradual increase in strength.

If extremely accurate dimensions are required, the slabs are cut with a diamond-edged saw blade, which is mounted on a special frame to permit horizontal movement long a traveler beam. This frame is elevated to a height of about 7 ft. from the floor level to allow room for the two saw tables built beneath it. The tables resemble an ordinary drop-leaf dining room table, in that the two end sections are pivoted. The entire table top is made of three sections of roller conveyor, the two pivoted end sections having shelf seats to receive the slab in a vertical position. By means of a winch arrangement, the slab is moved to the horizontal position, from which point it is rolled under the saw for cutting. Cut sections are returned to the pivoted end sections, where they are lowered to the vertical position for movement by fork lift truck to storage.

Slabs are loaded on low-bed trailers by means of industrial trucks using either the forks or the crane equipment (Fig. 4). Handled and packed in the vertical position, they are ready for job erection using standard cranes.

The trades used in both the factory

process and at the site are the same as were involved previously in field construction. In effect, the war techniques of fabricating sub-assemblies are used.

Use of precast building sections enables the builder to efficiently coordinate the activity of masons, carpenters, electricians and other trades which exterior wall work involves, with the added confusion of on-the-job casting or small masonry unit work. With precast building sections little or no storage area is required. The giant sections sharply reduce the time needed to build closure walls, particularly important during winter periods.

### Personnel

The demonstrated virtues of the Atterbury system over a period of three decades drew the interest of construction authorities in search of materials offering erection speed, strength combined with light weight, and low, competitive cost. As a result, Precast Building Sections, Inc. was formed and the first factory was built. The Atlas Corp. and City Investing Co. have substantial interests in the undertaking. Chairman of the Board is Alfred Rheinstein, president, Rheinstein Construction Co., Inc., and former chairman of the New York City Housing Authority and Commissioner of the Department of Housing and Building of the City of New York. Walter D. Binger and Kenneth A. Ives are members of the board. Norman D. Nichols is in charge of sales and production.

### Concrete Masonry Booklet

THE NATIONAL CONCRETE MASONRY ASSOCIATION, Chicago, Ill., has recently made available the booklet "Concrete Masonry in School Construction," second in a series of specialized booklets illustrating how concrete masonry can be used effectively in different types of structures. The first to appear was "Concrete Masonry in Church Construction." Others to follow will be devoted to residences, multiple dwellings, hospitals and basements.

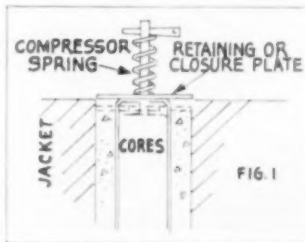


Fig. 1: Pressure plate diagram

# Simplified Method for Measuring Consistency of Concrete

Details are presented for an inexpensive and easily constructed ball penetrator that permits quick measure of consistency at mixer or on job

A SIMPLE FIELD TEST for consistency of concrete is described here, which consists in observing the penetration into the surface of a 30-lb. metal ball 6 in. in diameter. Through a coincidence, the penetration roughly equals half the slump. Similar penetration tests have recently been developed in England, Germany and Spain.

In spite of the simplicity of the accepted slump test, the authors have long felt that it could be excelled through the use of a greater force than the weight of the concrete itself to produce a positive displacement of the mass. The results to date indicate that there are useful possibilities in a penetration type of test having sufficient power, and displacing a sufficient volume of concrete, so that field conditions of placement are approximated fairly well. Though considerably further experience will be required to perfect the equipment and technique based on such a principle, it seems desirable to publish the results of the preliminary experiments and thus to encourage others to contribute to the development.

## Factors Considered

It must be understood clearly that the present discussion relates not to the complicated problem of *workability* with all its factors and nuances, but to the measurement of *consistency*, or whatever property is measured by the slump test. In fact, the remarkably close correlation with the slump test is the chief justification for describing the ball-penetration test at this time. At least the ball test is quicker and easier to perform, and can be made under certain conditions where the slump test is not applicable.

From the beginning of the author's investigations, metal balls had been tried in the belief that, under the constant force of the considerable weight of the ball, (1) the area of coverage would be great enough to integrate the resistance over several pieces of coarse aggregate, and (2) the volume of concrete displaced would increase so rapidly with depth of penetration that a single static test could be applied to both the stiffest and the wettest mixes that should be encountered in the range of plastic concrete. Various

By J. W. KELLY\*  
and NORMAN E. HAAVIK†

techniques were tried, including a "drop-ball" test which could easily be made in the field.

## Test Equipment

The test eventually adopted consists in observing the penetration of a 30-lb. plunger having a 6-in. hemispherical tip into the leveled-off surface of the concrete. The penetration in inches is read on the graduated handle of the plunger at the top of a sliding stirrup. This stirrup has two feet, each 1 in. square, which rest on the concrete. The penetration is read to tenths of an inch, usually as the average of three readings. The concrete may be in a container, wheelbarrow or cart, or in the forms, so long as the depth is at least 6 in. and the least horizontal dimension 12 in.

The original form of the device was a 6-in. cast-iron ball (Fig. 1), and for convenience the test is still called a "ball test." It was machined from a 6-in. steel cylinder, and the length of the cylindrical portion was made so that the plunger with handle weighs exactly 30 lb. Observations to date indicate no significant effect of the difference in shape (as between ball and cylinder) of the upper portion of the plunger, which comes into play only when the concrete is of wet consistency (slump greater than about 6 in.). In fact, the difference in shape in the fourth inch from the bottom (corresponding to 6- to 8-in. slump) is not very large. Mixes of slump great-

er than 8 in. should seldom if ever be manufactured, and in such the penetration would be reported as being greater than 4 in.

A portable form of the apparatus is shown in Fig. 2. The plunger tip is a hemispherical steel bowl available from chemical supply firms as a "sand bath." The plunger is the barrel of an automobile tire pump, cut down in length. Inside the barrel are two automobile valve springs, end to end. On the pump handle is machined a groove indicating when the hand-applied downward pressure (including the weight of the instrument) is 30 lb., as calibrated on an ordinary platform scale. The penetration scale is on the outside of the barrel. The pump base is ground to fit the bowl and is held in by spring clips which permit it to be disengaged and carried separately. The apparatus weighs only about 3 lb. and can be carried in an ordinary brief case. It is not so convenient to use as the dead-weight type, however, because the operator must simultaneously hold down on the handle and observe both the force mark and the penetration mark. Its use is limited to a penetration of 3 in.

The stirrup is merely a strap of  $\frac{1}{4}$ -by-1-in. steel, bent into any shape that will clear the plunger and having each end turned inward 1 in. to form a foot to rest on the concrete. The zero reading of the stirrup on the penetration scale can be checked easily by setting the instrument on a rigid level surface.

## Test Results

It has been found that 1 in. of penetration equals 2 in. of slump. The ratio of 2:1 is close, except that for the stiffer mixes the penetration is somewhat more than half the slump. This difference is characteristic; in part, it is probably due to initial penetration of a screeded-up surface layer of mortar, but in part it is believed to be due to greater sensitivity of the ball test at these stiff consistencies. Of course, in any comparison with the slump test it must be borne in mind that the slump test itself is often erratic. For most practical purposes, a 2:1 ratio can be used to convert penetration to slump, and *vice versa*. Original tests of intermediate consistency batches used only 0.2 cu. ft. of concrete, which filled the 12 in. diameter container to a depth of only 3 in. Particle interference resulted



Fig. 1: Original form of device was a 6-in. cast-iron ball

\*Professor of Civil Engineering, University of California, Berkeley.  
†Senior Engineer, Division of Civil Engineering, University of California, Berkeley



which invalidated initial tests. This effect was not discovered in time to replace the batches of this series with deeper batches such as those used in subsequent tests.

Recently E. L. Howard and his associates at Pacific Coast Aggregates, Inc., became interested in the ball test and have used it on hundreds of truckloads of ready-mixed concrete. They are still engaged in an extensive study of proportions and workability of the various mixes made at their several plants with a number of different aggregates. Wherever a slump test is made, a ball test is made also. As the ratio of 2:1 became established, the slump test was omitted for many batches because it was relatively cumbersome; only the ball test was used. The possibility of carrying a test ball on each truck has been suggested as an aid to determining consistency of each load quickly at the job and thus maintaining uniform control. Only border-line cases would require the specified slump test.

Another application of the ball test, in this case to mass concrete, has been made by Milos Polivka and associates at the University of California. The concrete contained aggregate of maximum size  $2\frac{1}{2}$  in., and the mixes were of the lean and harsh nature employed in concrete for dam construction. The results showed an average ratio of slump to ball penetration of 1.65, and the variation from batch to batch was reasonably uniform, considering that it was caused not only by the errors in testing but also the unavoidable variations in the batches themselves.

### Sampling and Testing

The "sample" of concrete is a relatively small volume at and surrounding the point of penetration. The size of the sample is effectively increased, and the representation of the entire batch or mass increased, by making three penetration observations as recommended for each test. Whereas samples for a slump test must be removed from the mass and rehandled in order to fill the mold, samples for the

ball test are in place within some mass of concrete.

In general, the recommended minimum horizontal dimension of the concrete under test is 12 in., in order to avoid edge effects. The minimum original depth of concrete for a satisfactory test depends both on the depth of penetration and on the maximum size of aggregate. The minimum clearance under the ball after penetration should be perhaps twice the maximum size of aggregate. Thus a 6-in. original depth would be sufficient for a concrete containing  $1\frac{1}{2}$ -in. aggregate and having a penetration of 3 in. (slump 6 in.), and would likewise be sufficient for a paving mix containing  $2\frac{1}{2}$ -in. aggregate and having a penetration of 1 in. (slump 2 in.). Thus, the minimum sample of concrete which would be employed in a cylindrical container would be 0.4 cu. ft., or about 60 lb. This is twice as much as would be required for a slump test. However, usually in practice the con-

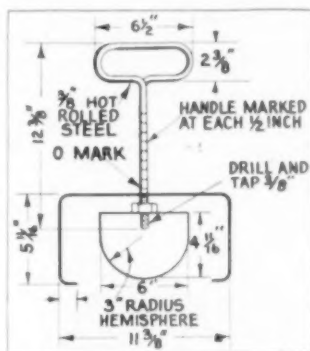


Fig. 3: Details of ball penetration apparatus

crete will be available in even greater amount, as in a hopper, wheelbarrow, cart, or form.

Admittedly the ball test does not measure lack of cohesiveness, or tendency to segregate, to the same extent as the slump or flow tests, in which the concrete may scatter. The ball test does respond to harshness in the form of particle interference. Inspection of the concrete after removal of the ball gives some visual indication of workability—in fact, the displacing action of the ball is somewhat similar to the common practical test of drawing a shovel heavily across the surface of concrete.

### Errors and Precision

No difficulty should be encountered in producing a ball of the correct size, shape, and weight and with a reasonably smooth surface finish. No significant errors of test, or differences as between apparatus used by different organizations, should occur from these sources. The apparatus is easily kept clean and free from caked mortar.

Personal errors might arise from



Fig. 4: Closeup of more economical form of ball penetration apparatus

differences in setting the ball on the concrete, taking the initial reading, or reading the penetration on the scale. With reasonable care, these errors should be well within the desired degree of precision. Care must be taken to see either that the stirrup feet do not penetrate the concrete or that any slight penetration which may occur in soft mixes is taken into account when the final reading is taken. On the whole, the personal factor should enter less into the ball test than into the slump test which involves a number of possibilities for personal differences in sampling, rigidity and surface finish of base, dampening the apparatus, filling the mold, rodding, raising the cone, freedom from jarring, and selection of point to which the slump is measured.

The penetration is read by estimation to 0.1 in., which corresponds to less than  $\frac{1}{4}$  in. of slump. This precision is sufficient for field work; in fact, the slump itself is seldom considered accurate within  $\frac{1}{2}$  in.

The amount of screeding to level off an area for test should be a minimum, otherwise a layer of mortar might be worked to the surface and result in an initial penetration before the real concrete mix is encountered by the ball. Again, error from this source can easily be kept within the least reading of the instrument.

### Applicability

The present application of the ball penetration test is limited to the range of plastic concretes, but it would seem reasonable that the consistency of no-slump mixes, even those for precast products, could be controlled by dropping the ball some fixed distance, as in the case of a German test previously developed. A series of drop-ball tests has been made by Misener. Also, the test can be made remote-reading, by extending the handle rod through a long tube attached to the stirrup. By means of this arrangement, in a ready-mix plant the test could be made on each batch of concrete in the hopper, which is considerably below the operating floor. At the job the test could be made in a deep wall form on the concrete in place.



Fig. 2: Portable form of ball penetration device

# MIDWEST READY-MIXED CONCRETE PRODUCERS MEET IN CHICAGO

**P**RODUCERS of ready-mixed concrete in Indiana, Illinois, Kentucky and parts of Wisconsin have a progressive organization in the Wabash Valley Ready Mixed Concrete Association, which was formed eight years ago. It is doing an effective job in tackling industry problems at the state level. The association now has 72 member companies and has a working program sufficiently attractive that ten new members were added this past year without solicitation.

The eighth annual convention of the Wabash Valley Ready Mixed Concrete Association, held at the Stevens hotel, Chicago, Ill., on March 23 and 24, had the usual excellent attendance and presented a well-rounded program covering business conditions, federal legislation, taxation, equipment, technical problems, specifications, public relations, truck drivers' education and marketing. It was patterned much along the lines of the program of the last convention of the National Ready Mixed Concrete Association.

The convention opened with a brief welcoming address by president Walter Acheson, who expressed pleasure with the growth of the association without benefit of any drive for new members. He gave credit to the existing members for the acceptance gained for the organization. He commented briefly on the second annual concrete school which was held during this past Christmas vacation period at Rose Polytechnic Institute in order to permit use of the Institute's facilities. Companies sent their key operating personnel to this school and, apparently, much of practical value was derived because the membership was unanimous in wanting the school to be continued annually.

The specifications committee, according to Mr. Acheson, was very active in 1949 and has concentrated on a program with the Illinois Highway Department. Mr. Acheson announced that Ernest Horne, Ready Mixed Concrete Corp., Indianapolis, Ind., was resigning as secretary-treasurer and was high in his praise of Mr. Horne's work. He has contributed his services without pay from the beginning of the association. J. W. Hunter, Danville, Ill., was thanked for his handling of the convention program.

## Equipment Development

In his talk entitled "New Developments of Equipment and Trucks," R. F. Bremner, general sales manager, T. L. Smith Co., Milwaukee, Wis., confined his remarks almost entirely to load limits, which constitute a most pressing problem to the industry and to the equipment manufacturers as well.

In Mr. Bremner's opinion, laws governing load limits for equipment traveling on highways are tending to restrictions which are based on too conservative estimates of the loads that highways can withstand and on too high an appraisal of the damage to roads from overloading. Protection of the old roads, he said, was the aim whereas the main road mileage could withstand greater loads. He believes that the restrictions on allowable loads about to be enforced will appear ridiculous 10 or 15 years from now and, as a result, equipment manufacturers would be subject to criticism from customers later should they (the manufacturers) now sell units of smaller sizes than will later prove by test to be permissible.

Mr. Bremner said that truck mixer manufacturers are redesigning whenever they can to reduce weight but, he said, reduction of weight by a given number of pounds does not mean that a like weight of concrete can be added to the payload. The answer to the entire problem, he said, was in putting the idea across to the proper authorities that ready-mixed concrete truck capacities and weights need not have to be reduced.

One producer who had purchased a unit minus the gasoline tank which, among other items, had been removed to cut weight, said that the Indiana gasoline tax laws permit a rebate of four cents per gal. for gasoline used to drive the mixer as contrasted for motive power. By pumping gasoline from the fuel tank to drive the mixer, a penalty of 4 cents per gal. then applied.

Stanton Walker, director of engineering, National Ready Mixed Concrete Association, took issue with Mr. Bremner on his statement that the new

roads could carry heavier loads. Mr. Walker suggested the possibility of shifting more of the load on trucks to the front axle, even though it involve redesign of steering mechanisms.

## Business Outlook

William M. Holland, executive secretary, Indiana Highway Constructors, commented on the highway picture nationally and for Indiana in the year ahead. Many of the figures given for the nation have already been printed. He commented on the new figures covering federal aid for highway needs which are higher than current figures and which have yet to be approved by Congress.

For Indiana, he said that there will be \$58,000,000 available for roads during the 1950 calendar year which is \$6,000,000 more than in 1949. Of the total, 53 percent will be for state highways, 32 percent to counties and 15 percent to cities. These funds will be matched with federal money for bridge and road building but, for maintenance, there are no matching funds. Some \$6,000,000 will be spent for resurfacing of state roads and \$3,000,000 for grade crossings. There is no direct diversion of highway funds in Indiana.

## Ready Mix in Chicago

H. F. Thomson, manager of the Ready Mixed Concrete Division, Material Service Corp., Chicago, Ill., gave a first-hand picture of the ready-mixed concrete situation in Chicago. Until recently Chicago had been the only metropolitan area in which the product had been unavailable (see *ROCK PRODUCTS*, December, 1949, p. 81) and for that reason Mr. Thomson's remarks were extremely interesting.

He stressed that the introduction of ready-mixed concrete into the city was a normal economic development. Prior to three years ago, he said, ready-mixed concrete was available in outlying areas and that two years ago, delivery into the city by dump-body trucks started from two outlying central-mixing plants. His own company has been producing ready-mixed concrete in a small way for years from one of its outlying gravel plants. Mr. Thomson said that, in the absence of ready-mixed concrete, dry batching had been developed to a high degree and dump truck equipment pools made mobile equipment immediately available in providing service to jobs.

He described the Material Service Corp. facilities which include seven locations from which mixers operate, all mixing in transit. Existing facilities

(Continued on page 134)



President-elect John H. Rudolph, Concrete Supply Co., Inc., Evansville, Ind.

# **SLASH**

**LABOR COSTS  
TO LESS THAN  
1¢ PER BLOCK**

with the  
**MULTICO**

# *Block Master*

**HYDRAULICALLY POWERED • FULLY AUTOMATIC OPERATION**

YES, you can really slash labor costs, break all production records, and fill orders faster and easier with the *Multico Block Master*. Just set the controls and the *Block Master* takes the aggregate, vibrates on pressure, then automatically tamps block to size, all in one operation—an exclusive Multico feature. Three men can run your entire plant—reduce overhead and produce finer quality Block faster. The *Block Master* is a standard production machine. The separate power pak can serve additional machines—another savings. The *Block Master* uses plain steel pallets, enabling you to produce any size or type of block desired.

**THE MULTICO BLOCK MASTER  
PERMITS OPERATION OF AN ENTIRE  
PLANT WITH ONLY 3 MEN**



#### **EXCLUSIVE FEATURES**

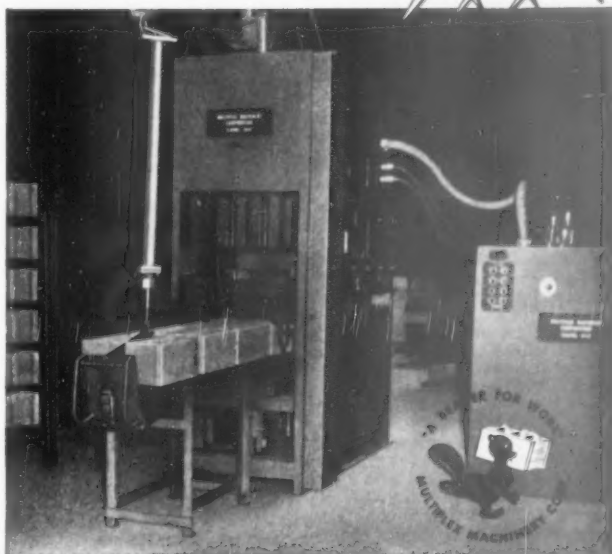
**Separate Power Pak Control Cabinet**

**Pressure-Vibration Plus Tamping**

**Handles All Aggregates**

**Makes All Sizes & Shapes of Block**

**Write for Free Catalog or location  
of nearest machine in operation.**



## **MULTIPLEX MACHINERY CORP.**

**ELMORE  
OHIO**

**MANUFACTURERS OF BLOCK MACHINES • MIXERS • SKIP HOISTS • STRIPPERS • ELEVATORS**

CONCRETE PRODUCTS, May, 1950  
A Section of ROCK PRODUCTS

ties for batching are in use, requiring two truck stops in charging. Over 50 units, all high-discharge of 4½- and 5½-cu. yd. mixer capacities, are now in service and additional units are on order. Three large central mixing plants are to be erected and from \$1,000,000 to \$1,500,000 are to be invested in equipment by summer.

Mr. Thomson discussed briefly the difficulties experienced in acquainting plant personnel with the problems in producing ready-mixed concrete and he also mentioned practices in Chicago with respect to concrete that present problems. One observation is a tendency to use wet mixes and another is the improper handling of test cylinders. One of the headaches has been that purchasers, not accustomed to place great quantities of concrete, often have not provided adequate forms.

### Quality Concrete

B. R. Petrie, field engineer, Indianapolis district, Portland Cement Association, gave a very interesting discussion on "Fundamentals of Quality Concrete." His presentation was essentially the same as presented at the concrete school, Rose Polytechnic Institute, and was based largely on the ninth edition of the booklet, "Design and Control of Concrete Mixtures," published by the Portland Cement Association. Rather than attempt to abstract Mr. Petrie's ably presented talk, it is suggested that the aforementioned booklet is an education in the principles of good concrete.

### Legislation

Wilbur Lester, attorney, pinch-hit for V. P. Ahearn, executive secretary, National Ready Mixed Concrete Association, who was still recuperating from an operation, in a presentation on "Federal Legislation and Tax Regulation for 1950." Mr. Lester covered the subject thoroughly, but there has been little new information available since the subject was covered by Mr. Ahearn at the annual convention of the National Ready Mixed Concrete Association.

Being an election year, Mr. Lester said that there is little likelihood of much tax legislation by the 81st Congress. As to the Taft-Hartley Law, he said that there is need for some modification due principally to a weakness in the provisions with respect to national emergencies, which lead to false assurances on the provisions as a remedy. He commented on the Wage-Hour Law and the determination of prevailing minimum rates of wages to be made for the sand and gravel and ready-mixed concrete industries. As to the Fair Labor Standards Act, the coverage is most important but, he said, no definite answers can yet be made until cases are decided.

### Strength Specifications

On the second day Stanton Walker, director of engineering, National Ready Mixed Concrete Association,

opened the morning session with a discussion of technical problems of the industry. As to strength specifications, he feels that it is necessary to take into consideration strength-producing characteristics, and that properties of aggregates vary more than do cements. He advised operators to examine the source of aggregates from the viewpoint of price, appearance, and strength, and to pay premium prices if necessary. Then proportions may be selected for strength specifications.

Mr. Walker suggested many practices that should aid producers in making a good mix consistently. He suggested that as few sizes as possible should be handled, such as No. 4 to 1½ in. Stockpiles for these materials must be built carefully to reduce segregation. He also thought that concern over water content has been overemphasized, inasmuch as there are so many other variables. For instance, he quoted figures which indicate that a typical sand pile will vary in moisture content 4-18 percent from day to day. A 1 percent variation in the water added to a batch may mean a difference of 13-14 lb. of water, or 1½ gal., or ½-in. slump. Instead, Mr. Walker stated that he would like to see control over consistency emphasized more, though much can be done in the matter of controlling moisture content by providing a good place for piles to drain before transfer to bins or silos.

Control over consistency automatically controls the water content, according to Mr. Walker. In this case there would be little need to emphasize accurate measurement of water. As yet there is no good way to measure consistency in a transit mixer, he said, adding that the Plastograph (see *Rock Products*, February, 1950, p. 159) is in use in stationary mixers, where such information is needed least. What is needed most of all, Mr. Walker pointed out, is a method for measuring water in aggregate.

Mr. Walker illustrated the effect of mixing time on quality of mix by drawing a graph on a blackboard. It was readily seen that the importance of mixing time increased with the use of air-entraining agents, for after 15 min. mixing, the maximum amount of entrained air is usually present; from this point air is lost to a maximum of about 1-2 percent in 1 hr. He also discussed air-entraining agents, stating that the use of admixtures permitted the flexibility of varying the amount added. The various types of admixtures were mentioned with information regarding the purpose of each.

The speaker remarked that he does not feel that strength tests of concrete samples are very reliable. He justified this position by stating that there are many inherent variations in obtaining representative samples of the mix. This means that two guarantees seem necessary, one for strength requirement and the other for the method of obtaining and testing the sample.

Mr. Walker commented briefly on puzzolana, of which fly ash is one of the most important. These inhibit alkali reaction, probably by distributing the reaction through the whole mass. Many producers think of puzzolana as cement savers; actually, the speaker said, it appears probable that 15-20 percent of cement can be replaced by fly ash with no sacrifice in 28-day strength. The engineering director closed with a description of some of the equipment at the new association laboratory at the University of Maryland, and described some of the tests under way in evaluation of aggregates from different sources and the feasibility of beneficiation.

H. W. Russell, engineer of tests, Illinois State Highway Department, spoke on ready-mixed concrete specifications for state highway work. Use of ready-mixed concrete for highway work is increasing so greatly that

(Continued on page 116)



New Board of directors (partial) are, left to right, top: C. S. Ward, C. C. Doal, Ernest Horne, John H. Rudolph, president; Walter H. Acheson, past president; and C. P. O'Leary. Seated are: L. L. Shidler and L. A. Kohn

# ayr trap

HORN

the air-entraining  
agent  
for concrete

## Indispensable for Heavy Concrete Work

Ayr-Trap can be added at batching plants or on the job. It makes concrete more durable, increases its plasticity and minimizes segregation and bleeding. Ayr-Trap improves sealing resistance, chloride salt resistance and protects concrete against its most common failures. Ayr-Trap permits a reduction in the water cement ratio. Used in liquid form as follows: 3 liquid ozs. per cubic yard of 5 or 6 bag mix—1 pint per 5 cubic yds. 6 bag mix.

### A. C. HORN COMPANY, INC.

Manufacturers of materials for building maintenance and construction—established in 1897  
10th Street & 44th Avenue, Long Island City 1, N. Y.  
Los Angeles • San Francisco • Houston • Chicago • Toronto  
SUBSIDIARY OF SUN CHEMICAL CORPORATION

### COLONIAL SAND & STONE CO.

130 ROCKEFELLER PLAZA

NEW YORK 20, N.Y.

TELEPHONE  
CIRCLE 8-3432

Mr. A. C. Horn  
A. C. Horn Company  
65-62 10th Street  
Long Island City, N.Y.

Dear Mr. Horn:

Concerning your inquiry, we would like to state that we have been using Ayr-Trap on many thousand yards of concrete for about 2 years time. Our experience with this material has been entirely satisfactory.

We have found:

1. Concrete with this mix does not suffer any reduction in strength in the winter mixes and in the summer mixes show an increase in strength.

2. Same is not sensitive to variations in the type and amount of sand incorporated in the mixes, therefore, we are not called upon to change the amount we add everytime a new sand or a different mix is used.

3. No elaborate equipment is necessary for dispensing same. Ordinary pick measure is used. Variations on the recommended quantities does not seriously affect the results.

4. Adding this material to the mixes simplifies our plant operations in that we do not have to tie on dry storage hoppers as would be required with the interground cement. Errors that would result with the variations of cement as required are reduced.

Very truly yours

COLONIAL SAND & STONE CO., INC.  
*Frank L. Kelly*  
Frank L. Kelly  
Vice President

GENTLEMEN:

Please send complete data on AYR-TRAP.

NAME \_\_\_\_\_ TITLE \_\_\_\_\_

COMPANY \_\_\_\_\_

ADDRESS \_\_\_\_\_

CITY \_\_\_\_\_ STATE \_\_\_\_\_



special standards have had to be set up. Mr. Russell said that specifications for Illinois have been issued recently, tied closely to A.R.B.A. bulletin 15. Illinois requires a full time proportioning engineer assigned to big jobs. For smaller jobs, batch weights are given, which has resulted in better supervision and control. All cement is tested. Plants are checked approved, then checked periodically.

Mr. Russell commented that the manner of operation of equipment and not the equipment itself may be a possible cause of many producers' troubles. In this respect he cited the need for driver education. Arbitrary adding of water at the job reduces control. A survey of drivers conducted recently showed that many did not measure water within specified tolerance; in addition, many water meters were found to be inaccurate. Capacity of mixers is oftentimes exceeded, with bad results many times. Mr. Russell said that continuity of delivery should receive more attention of producers supplying highway projects. Deliveries are off schedule too often, the speaker noted. Usually 4-8 percent less concrete is delivered than is required, too.

In the discussion that followed the talks by Mr. Walker and Mr. Russell, it was stated that there is a 1½ in. loss in slump for each 100 deg.-hr. on the basis of tests run by the National Ready Mixed Concrete Association at a plant in Louisville, Ky. Glenway Maxon commented that there is little loss in slump if coarse aggregate is moistened and cooled before use, and an air-entraining agent added. It was brought up that Indiana seems to be one of the few states that accepts the use of cement on the basis of mill tests. In other words, cement shipped from an approved mill is acceptable for use on state highway projects without further inspection. Indiana also permits the use of such cement for use on other than state projects if the producer pays for tests. The state does take aggregate tests about once a week.

In the Chicago area, where most plants are for transit-mixed concrete, truck drivers have lost up to 4-5 min. after starting the mixer in picking up tickets and in other time-consuming operations. It was suggested that mixing should be required at the plant before leaving in lieu of revolution counters. Temperatures should be kept down in the 70's, was one comment.

The discussion period closed with the observation that the ready-mixed concrete producer is caught in the middle—he does not usually have any control over the washing and screening of aggregates nor does he have any control over the grinding of cement.

### Advertising

Charles Keene, manager of advertising and publications bureau, Portland Cement Association, outlined to

the producers how an advertising program could be conducted without putting a big dent in any budget. He defined advertising as getting a message over to a great number of people. Mr. Keene distributed samples of the ready-mixed concrete advertising kit and explained how, with its use, virtually any number of ads could be composed using material supplied by the P.C.A. Radio commercials also came in for their share of attention. The P.C.A. spokesman also had samples of spot commercials the association can supply to promote the sale of ready-mixed concrete; a few were demonstrated on the public address system. Mr. Keene mentioned results of a survey of producers and contractors asking for complaints about ready-mixed concrete service around the nation. The general complaint seems to be that there are too many delays in deliveries, and that concrete cannot be placed on schedule.

### Driver Education

A. C. Modahl, Modahl & Scott, Bloomington, Ill., presided at the concluding meeting of the convention. W. E. Clark, general manager, Keystone Division, Dravo Corp., Pittsburgh, Penn., presented individual pages of a book put out by Dravo Corp. for truck driver education and employee relations which were projected on a screen. This was the same presentation he gave before the N.R.M.C.A. convention in January. Each page of the book carries a cartoon that puts across to truck drivers some salient point in safe vehicle operation, maintenance, or public relations in such a manner as to be readily accepted as well as remembered by the drivers.

The second part of Mr. Clark's presentation was devoted to a preview of a similar book brought about through the cooperation of the National Ready Mixed Concrete and National Sand and Gravel Associations and adapted for multiple printing so as to be available to individual companies. The book is printed in two colors and will be of a handy pocket-size so that

drivers may carry it with them on the job. Actual experience of Dravo's drivers when, for instance, a long delay is experienced in delivery of concrete, has shown that by the driver's pointing to the cartoon in his book concerning that matter, the customer more readily signs the delayed delivery slip. The same is true for delivery impossible due to terrain.

Mr. Clark is chairman of the committee of the national association working on a booklet acceptable to all member companies and which will contain between 30 and 40 pages. It will cost member companies not over 75¢ per copy. Space will be provided on the back of the book for a company imprint.

Due to the fact that wage scales, overtime pay and bonus systems vary with different companies, the booklet will merely suggest a form and individual companies will have this printed locally to include applicable figures. Also, the association book will cover both ready-mixed concrete and sand and gravel truck deliveries, so pages not applicable to a particular company may be deleted without injury to continuity of the book. Mr. Clark said that the booklet was an approach to truck driver education and was not presented as being the whole or final answer. He went on to mention truck driver meetings and schools as carried out by his company.

### Public Relations

Marshall D. Abrams, managing director, Construction League, Indianapolis, Ind., gave an address titled "Public Relations in the Ready-Mixed Concrete Industry." The speaker gave several actual examples of large national corporations that had instituted public relations departments. He went on to say that the modern concept of public relations was in no way associated with publicity or the work of a press agent, as it had been in the past. Mr. Abrams said that one point in improving public relations that was being grasped by heads of more and more large companies was to make themselves readily and personally available to outsiders.

Public relations, the speaker pointed out, is a concern primarily of top management, for the term means not only public in the sense of community or customer relations, but also employee relations. Good employee relations are recognized by today's executives as the number one problem in conducting a successful business.

At the close of this final session, Mr. Modahl introduced John H. Rudolph, the new president, for the benefit of those who had been unable to attend the luncheon meeting, at which time he was elected. Mr. Rudolph spoke a few words concerning the association and its plans in the coming year and named four chairmen of state groups to work with officials on local concrete specifications. These chairmen, picked from the board of di-

(Continued on page 138)



Prof. R. E. Hutchins, Rose Polytechnic Institute

**Seal GUARANTEED for one year**

The seal between the revolving hopper and the mixing drum is never broken! Blaw-Knox guarantees the seal on the Hi-Boy Trukmixer for one year, providing it is greased daily. It's the end of tailgate trouble!

**Only on BLAW-KNOX  
Hi-Boy TRUKMIXERS**

**NO DISCHARGE DOOR!**

No possibility of segregation, because there's no door to provide a means of segregation during discharge.

★ **FREE DISCHARGE WITHOUT SEGREGATION**

Discharge speed is controlled by the rotation of the drum . . . a handful or the whole load *without segregation*. Wide flanged discharge blades extending past the end of the unrestricted 32" drum opening give high speed, uniform discharge even with zero slump concrete.

★ **UNIFORM, THOROUGH MIXING**

Deep spiral mixing blades and the big auxiliary blades turn the batch over and over, quickly producing a thorough, uniform mix even when zero slump concrete is specified.

★ **CONSISTENTLY LOW MAINTENANCE**

Seal failure and leakage of grout or water are eliminated once and for all! The Hi-Boy has the *only* rear end hopper seal that operates safely while submerged in concrete. When a worn seal does have to be replaced, it can be done easily in 30 or 40 minutes.

★ **HIGH DAILY PAYLOAD AVERAGE**

Only a rear end hopper gives you faster charging, an initial mix while charging, instantaneous shrinkage of the batch and greater capacity. The Hi-Boy assures a high daily payload average and a *high daily profit* on every job.

**SPLIT-SECOND  
CHARGING**

The Revolving Hopper permits the fastest charging you ever saw. Hold the batcher discharge gate wide open . . . the materials cascade through the big drum opening and start mixing immediately. A flick of the latch automatically inverts the hopper for discharging in three seconds.

**WRITE for details about  
the BLAW-KNOX  
Ready-Mix "Complete  
Package"**

SEE YOUR NEAREST BLAW-KNOX HI-BOY DISTRIBUTOR FOR COMPLETE INFORMATION

# BLAW-KNOX

BLAW-KNOX DIVISION of Blaw-Knox Company  
Farmers Bank Bldg., Pittsburgh 22, Pa.



**A COMPLETE  
READY-MIX  
OUTFIT  
IN ONE  
PACKAGE  
from  
BLAW-KNOX**  
*Material Handling  
and Storage,  
Batching  
Truck Mixers*



A total investment of only \$18,000 opened up a brand-new ready-mix market of farmers and local contractors in Winterset, Iowa (pop. 4000).

Concrete Products Co. bought a paver, a bin batcher, a bucket elevator and two Dumpcretes. With this complete operation they can control mixes accurately and deliver air-entrained concrete that is superior to much mixed today by other methods.

Their low-cost, non-agitating Dumpcretes mount on light trucks, load fast and discharge fast or slow—through a long, 13-foot chute. Neither segregation nor bleeding is a problem. Mont C. Johnson of Concrete Products Co. says, "Fifteen and 20 mile hauls are commonplace . . . We have had excellent acceptance of our product."

You are sure to want the details of this efficient ready-mix operation that delivers 50 to 100 yards a day. Mail the coupon today. There's absolutely no obligation.

Send me facts about low-cost ready-mix plants and the Dumpcrete.

The lower-cost Dumpcrete is lightweight, watertight, with 13-foot chute, controlled higher discharge and lower center of gravity. Hauls sand, gravel, and coal too.



Name \_\_\_\_\_  
Firm \_\_\_\_\_  
Address \_\_\_\_\_  
**DUMPCRETE**  
DIVISION MAXON CONSTRUCTION CO. INC.

571 Talbott Bldg., Dayton 2, Ohio

### CARPENTER SEPTIC TANK FORMS

and handling equipment are preferred by large precast tank manufacturers because they use

#### MINIMUM TIME and LABOR in



Pouring  
Striping  
Handling  
Resetting forms  
Pouring again  
LASTLY, and not least—  
ONE MAN makes the delivery with a CARPENTER DELIVERY RIG.

**CARPENTER  
MANUFACTURING  
COMPANY**  
Phone 22018  
R.F.D. 1, Box 470  
Richmond 23, Virginia

JOIN  
THE  
11,931  
PRODUCERS  
WHO  
REGULARLY  
READ  
ROCK  
PRODUCTS

rectors of the association, are: Charles Ward (new vice-president of the association), Illinois; Charles O'Leary, Indiana; L. A. Kohn, Wisconsin, and James McCracken, Kentucky. These four chairmen will appoint members from the association membership in their own state to form the committees that will work for the next year on specifications with various state representatives.

#### Business Session—Officers

At a luncheon business session, Professor R. E. Hutchins, Rose Polytechnic Institute, reported on the concrete school for plant operating men. There were 72 registrants.

It was voted to increase the board of directors to 11 members, with three new members to be elected each year, in order to have more favorable representation.

John H. Rudolph, Concrete Supply Co., Inc., Evansville, Ind., was elected president, C. S. Ward, Nelsen Concrete Culvert Co., Mt. Vernon, Ill., was elected vice-president, and Ernest Horne, Ready Mixed Concrete Co., Evansville, Ind., was elected treasurer.

Elected directors were John Rudolph and L. A. Kohn (1 yr.); C. S. Ward and Henry C. Wolf (2 yrs.); and Ernest Horne, L. L. Shidler and Ed Scott (3 yrs.).

#### Autoclave Products Men Meet in Washington

THE 44TH ANNUAL CONVENTION of the Autoclave Building Products Association, formerly the Sand Lime Brick Association, was held at the Hotel Statler, Washington, D. C., March 2-4. The meetings, which were open, drew more than the usual number of guests, including representatives of several governmental agencies and private trade associations. The first morning session was an informal get-together for renewal of acquaintances and appointment of committees.

The first formal session opened in the afternoon of the first day with a discussion on "Research in Autoclave Concrete Products, the Key to Expansion in the Industry." Under this heading, basic research was discussed by Dr. George Kalousek, lecturer in chemistry, and applied research by John K. Selden, Coordinator of Housing Research, both of the University of Toledo Research Foundation.

In his talk on basic research, Dr. Kalousek contrasted basic and applied research and the possible integration of the two in the field of autoclaved building products. Specific reference was made to the nature of the cementitious matter in a concrete block. The fundamentalist thinks of a normally cured cement unit in terms of the properties of a gel, such as high internal porosity with resultant shrinkage on drying. He can predict something of the behavior of that gel as it is subjected to changing condi-

tions. The plant technologist or service engineer, on the other hand, is concerned with the production of a block that will give a satisfying performance in service, and makes changes in his raw material or processing to give the desired result. Experience has indicated that high pressure steam processing gives a product of relatively greater dimensional stability than is obtained in normal curing. This difference would be predictable from known basic properties of gels. Powers and Brownyard have shown that a moist cured concrete has a surface area of 115 sq. m/g., which value lies in the range for gels, whereas the same concrete when cured at high pressure showed a surface area of 6 sq. m/g., a value normally prevailing for microcrystalline solids.

A comparison of some recent thermal analysis data obtained by Dr. Kalousek on a concrete cured over the temperature ranges of 70-212 deg. F. and 340-390 deg. F., with previously published strength results, showed an interesting correlation between reaction products and strength. From 70 to about 130 deg. F. the effect of temperature is merely an acceleration of the hydration reactions with attendant strength increases; between about 140 and 200 deg. F. the monosulfate form of the sulfoaluminates appear in relatively greater abundance and the gels indicate a decrease in porosity. At 340-390 deg. F. the cementitious matter consists of a gel of very low porosity (or alternately a microcrystalline product) and an abundance of the platy dicalcium silicate hydrate discovered by Thorvaldson and Shelton. The latter solid does not necessarily account for the observed marked increase in strength, which could be attributed equally as well to a change in the gel phase.

Dr. Kalousek, on the basis of the stated observations, suggested that basic research on the nature of the gels in concrete and related products could be integrated to great advantage with applied research.

Mr. Selden took for his illustration of applied research his own pioneering venture in the development and manufacture of high pressure steam cured cast stone for the Roettcher School for Crippled Children at Denver, Colo. These autoclaved slabs were probably the first, or one of the first, applications, outside of ordinary concrete and cinder block, of the very extensive basic investigations into high pressure steam curing conducted by Carl A. Menzel at the Portland Cement Association. Photographs taken in 1940, when the school was first erected, were shown of the building as a whole and of the cast stone details; other photographs taken in 1950 showed the excellent weather resistance of the surface and comparative freedom from shrinkage cracking at the joints of these slabs after 10 years of exposure.

The "preshrunk" nature of the slabs was emphasized by the fact that the

**3000 READY-MIXED PLANTS ASKED FOR IT**

**a lighter, faster truck mixer...  
hundreds of dollars lower priced**



**JAEGER "PAYLOADER"**  
**2-3-4½-5½ YD. SIZES**

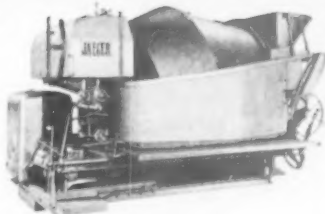
**600 to 1600 lbs. weight reduction, meets strict load limitations:** Yet sturdier, more rugged in frame and vital parts than ever before.

**9 to 13 inches shorter, for better truck mounting:** Less cab-to-axle requirement for short wheelbase trucks, correct load centering on all models for long truck and tire life.

**Faster in operation — more trips, payloads per day:** 10 seconds per yard to endload dry materials with new hopper and high drum "charging" speed. Topload wet material in one shot thru quick opening "toggle lock" door.

**One wheel turn fully retracts hopper for discharge.** High drum "discharge" speed thru Jaeger 2-speed transmission, plus low angle discharge cone and continuous blades, discharges 4" slump concrete at 20.25 seconds per yd., 1" slump in 60 seconds.

**Pressure-jetted water distribution and 2-speed "Dual Mixing" with "Throw-Back Blades," insure higher strength concrete:** The reason more concrete is sold by Jaeger Truck Mixers than by any other method.



**30% LOWER MAINTENANCE COST  
... MORE HOURS ON THE ROAD**

**New "Spider" drum drive:** Saves weight, insures an always self-aligning drum.

**Unit power and transmission:** A major improvement. Permanent gear alignment.

**Instant opening, self-aligning hopper, long-life seal:** Eliminates all end loader headaches. One wheel turn retracts hopper 9" for discharge. Self-centering drive pins hold it in positive alignment on roughest ground. Seal self-lubricated from 5 lb. grease reservoir. Seal replaceable in 30 minutes without removing hopper.

**Ask your Jaeger distributor to show you these and many other  
Jaeger-engineered improvements—or send for complete Catalog TMH-10**

**THE JAEGER MACHINE COMPANY, Columbus 16, Ohio**

**AIR COMPRESSORS • PUMPS • MIXERS • HOISTS • TOWERS  
AGGREGATE SPREADERS • BITUMINOUS PAVERS • CONCRETE SPREADERS, FINISHERS**



# Specify GENUINE Clipper SUPERIOR BLADES Cut Any Masonry Material Easily

Regardless of hardness...there's a GENUINE Clipper Superior Blade to cut any masonry material with perfect smoothness and real economy.

Measuring selected abrasive for Clipper Superior Blades requires the care of experts.



Infinite skills required in the hydraulic pressing of Clipper Superior Blades.



## YOU CAN DEPEND ON CLIPPER SPECIFICATIONS

Every Clipper Blade is the result of constant research and is recommended with expert knowledge of masonry materials. When you have the correct GENUINE Clipper Superior Blade or Clipper Bonded Diamond Blade for WET or DRY cutting you'll find it easy and economical to slice thru the hardest materials.



Attaching blotters to Clipper Superior Blades after individual selection and testing.

Cutters or Cases. Clipper Superior Blades are packaged for convenience and protection.



## SOLD ONLY... DIRECT FROM CLIPPER FACTORY BRANCHES

Because of the tremendous variety of masonry materials the correct Clipper Blade for your Brick, Tile, Stone or Concrete Product can only be recommended by masonry specialists! "SAME DAY" Shipment from 9 Clipper Branches or the EXACT Specification for any material... WRITE TODAY and mention the material!

## GENUINE CLIPPER BLADES Over 57 Specifications



2807 W. Warwick • Kansas City 8, Mo.  
Philadelphia LA 4-380 St. Louis JE 1290 Cleveland CH 1-380 San Francisco UN 3-1555  
Austin, Tex. PH 4-080 Chicago PH 2-7332 Pittsburgh AT 1-2040 New York MU 7-5400

stones came out of the autoclave so dry that they tended to gain rather than to lose weight in the air. The coefficient of shrinkage from saturated to oven dry condition was less than 0.03 percent.

In addition to the great reduction in shrinkage, Mr. Selden emphasized the advantage of the high strengths, 13,000 p.s.i. and over, obtained in 24 hr. at 125 p.s.i. steam pressure. It was his opinion that a whole new field for research, development and industrial expansion could be opened by the autoclaving process.

Following a brief recess, Mr. Selden led a discussion on "The Problem of Shrinkage Cracking in Concrete Masonry." Photographs of severe shrinkage cracking in cinder block partitions were shown and increasing concern of both users and manufacturers over the problem was noted.

Mr. Selden then outlined the investigation into "The Relationship Between Moisture Content and Volume Change in Concrete Masonry Units," which it was expected the Research Division of the Housing & Home Finance Agency would soon sponsor at the University of Toledo Research Foundation. It was explained that measurements would be made on both bars and full size block and that the effect of such variables as type of aggregate, cement factor, and temperature and pressure of curing on the moisture content-shrinkage relationship would be studied. Pictures were shown of a simple method of measuring length changes to 1/10,000 in. in concrete block by embedding stainless steel balls in both ends for gauge points. Recommendations from the manufacturers present for typical curing schedules at both high pressure and atmospheric pressures were sought.

## Shrinkage Cracking

The Friday morning session was to have been addressed by Dr. F. O. Anderegg, director of building materials research at the John B. Pierce Foundation, Raritan, N. J. However, due to an emergency, he was unable to attend. Max Barth, assistant to H. B. Zackrisson of the Army Corps of Engineers, who kindly consented to take Dr. Anderegg's time, gave an informative summary of the Army's difficulties with shrinkage cracking in its facilities in various parts of the country. A comprehensive survey showed that cracking was most severe in certain parts of the country, notably in the Southwest. Unfortunately, this same region accounted for a large percentage of Army construction. A lively discussion followed Mr. Barth's talk. Manufacturers of autoclaved products were of the opinion that high pressure steam curing greatly reduced shrinkage but was no cure-all for poor workmanship either in manufacture or construction.

Rather than to leave Dr. Anderegg's subject of "Hydrothermal Reactions" completely untouched, Mr. Selden, who

like Dr. Anderegg had been associated with the development of "Microporite," took a few minutes at the close of the session to outline the pioneering efforts of Dr. Anderegg in the development of this lightweight autoclaved calcium silicate product.

Friday afternoon the convention delegates were guests at the National Bureau of Standards, where they were received by D.E. Parsons, Lansing S. Wells and J. W. McBurney and conducted through the many mechanical and concrete testing laboratories, fire test laboratory and other facilities of the bureau. The high spot of the tour was watching a welded section of a ship's hull being tested to almost a million pounds and hearing the report when it failed.

## Specifications

Dr. Lansing S. Wells, a longtime friend of the Autoclave Products group, addressed the last open session outlining his thoughts on specifications for autoclave building products. Dr. Wells emphasized that any specification for autoclaved products must be based on the product itself and not on any prescribed process which would require plant inspections. The tests called for should be adaptable to apparatus already available in the laboratory and should be made as simple as possible. Attention was called to the British standard tests for shrinkage in which a saturated sample is placed in a cabinet over calcium chloride at 70 deg. F. and kept there for a week or so until it reaches equilibrium moisture content. Shrinkage is measured from the saturated to the desiccated condition, all at the same room temperature.

Following Dr. Wells' talk, a brief outline of the new carbide sludge method of making sand lime brick at the Detroit Brick & Block Co. was presented by Jack Doerr of the company.

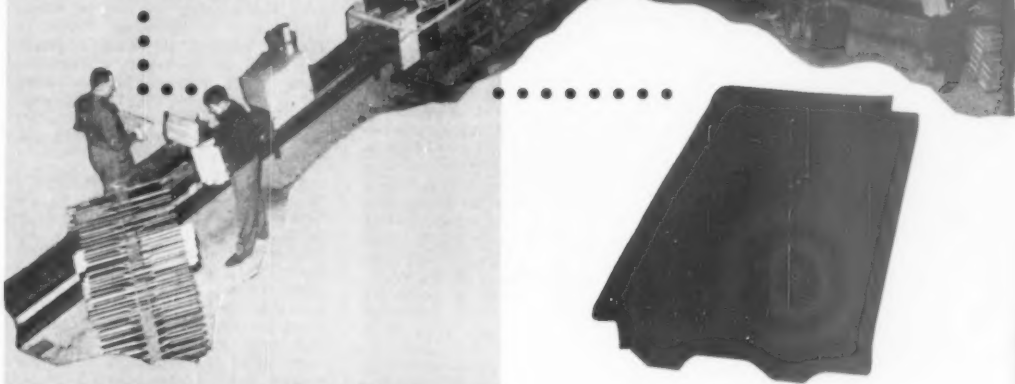
At the business meeting after the prepared program, Dale Cobb, of Century Brick Co., Monroe, La., was appointed chairman of a sand lime products committee and M. W. Ferguson of the Pre-Shrunk Masonry Sales Co., Roanoke, Va., was appointed chairman of a committee concerning concrete products. Each chairman was authorized to select the members of his committee. The function of these committees is to take up projects and matters of interest concerning their particular products of the industry.

The following officers of the association were elected to serve for the year 1950: president, J. W. Van Brunt, Grande Brick Co., Grand Rapids, Mich.; secretary-treasurer, Carl Miller, Pacific Brick Co., Pacific, Mo.; and western executive secretary, Elmer Coats, Mutual Materials Co., Seattle, Wash.

Through the courtesy of Dr. and Mrs. Lansing Wells, an interesting program for the ladies also was provided.

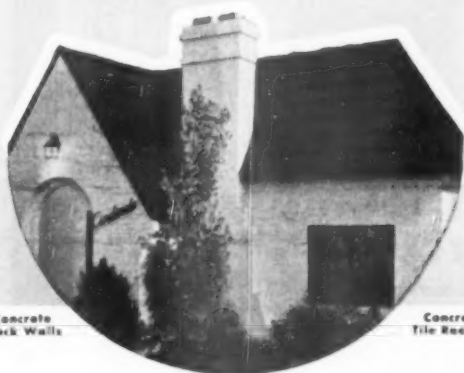


# ROOF TILE MACHINE



## Fully Automatic!

- 16 to 24 tile a minute
- Application of headcheck in manufacture
- Pallet Feeding and Loading of Pallets
- Oiling of Pallets
- Eccentric roller action knits concrete
- Coloring of tile in manufacture
- Feeding of Aggregate
- Permits use of aggregate of minus 1/4 inch



Concrete Block Walls

Concrete Tile Roofs

### PERMANENT —

Besser-Anza Roof Tile are as permanent as the best concrete block walls.

### WEATHERPROOF —

Headcheck and precision fitting baffles weather and storms.

### FIREPROOF —

Permanently eliminates one of the greatest hazards in housing structures.

### CHARACTER —

French, Spanish Mission or modern designs offer distinctive appeals.

**BEAUTY**—Charm and quality appearance come with color and sturdiness.

**INSTALLATION**—Precision fit eliminates sheathing and underfelt.

**ECONOMY**—Headcheck allows exposure of maximum tile surface.

Besser-Anza roof tile is outstanding in Durability, Beauty, Fireproof, No Upkeep, Improves with Age, Stormproof. Roofs that will blend with any style of architecture for new or old buildings—the ultimate in protection.

Tile that are true and perfect in shape, uniform in size allowing unskilled labor to lay them and each tile covers a maximum surface.

Write Today for Literature

# BESSER

Complete Equipment for Concrete Products Plants

BESSER MANUFACTURING COMPANY • ALPENA, MICHIGAN, U. S. A.

## SPECIALTY MOLDS



**WE** are the largest manufacturer of molds for making ornamental concrete, including urns, benches, tables, bird baths, animals, birds, etc.

Turn Concrete Into Gold with our equipment! We also manufacture molds to order and invite your specifications.

SPECIALTY MOLD DIVISION  
CONCRETE MACHINERY CO.  
HICKORY, N. C.

## Better Concrete Conference

A "BETTER-CONCRETE CONFERENCE" was held at Iowa State College at Ames, March, 16-18, under the joint auspices of the Department of Theoretical and Applied Mechanics and the Engineering Extension Service. The Conference constituted a resumption of similar conferences or short courses which had been held at intervals during the period between the two world wars. What was probably the earliest concrete conference in Ames was held about 1911.

The total enrollment of about 80 contained a representative cross-section of the concrete industry of Iowa, including builders and contractors, ready-mixed concrete operators, cement manufacturers and suppliers, representatives of testing laboratories, concrete products producers, and representatives of city, county and state highway engineering organizations.

At the opening session, under the title "Enigmas of Plain Concrete," Professor H. J. Gilkey, Iowa State College, pointed out the incomplete state of our knowledge of concrete as strikingly emphasized by seeming contradictions of fact. Among the aspects mentioned or discussed briefly were: mixing water vs. water for curing; voids-cement ratio vs. water-cement ratio vs. air entrainment.

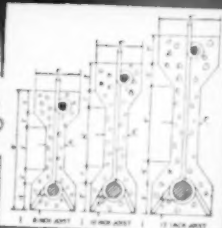
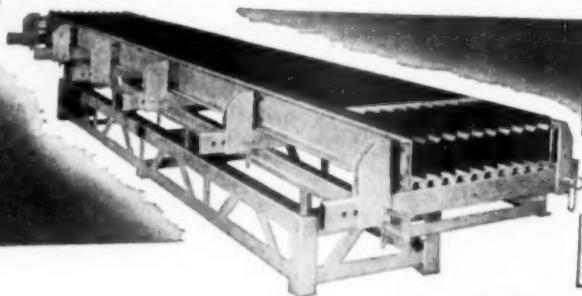
Bert Myers, engineer of materials and tests for the Iowa Highway Commission, presented unpublished data

on the voids-cement ratio and water-cement ratio in relation to design of mixtures. The data presented were from a large number of specimens and were very consistent.

Marta D. Blue, structural field engineer for the Portland Cement Association, gave an illustrated discussion of concrete structural types and practices representing the best of recent construction in the area. Carlos D. Bullock, regional structural engineer for P.C.A. at Kansas City, discussed some of the problems of prestressed concrete, indicating that he considered it an extremely important near-future development, especially in connection with precast units.

Professor Henry Giese, Department of Agricultural Engineering at the College, discussed concrete practice in relation to its farm adaptations. He emphasized particularly the backwardness of farm users in recognizing that cleanliness and proper grading of aggregates were of great importance from the standpoints of both quality and costs, and that blind insistence upon using the source of aggregate nearest at hand often proves to be uneconomical if not disastrous.

Professor L. O. Stewart, head, Department of Civil Engineering, presided at the Thursday evening dinner session at which Lieutenant Colonel H. K. Howell, Corps of Engineers, discussed the Veterans' hospital at Iowa City, one of the largest in the



## ... ADD A NEW PROFIT-MAKER! INCREASE YOUR VOLUME

**Only small  
investment required!**

The addition of the Kirk & Blum Vibrating Table to your present equipment requires a very small initial cost, enables you to make an entirely new line of 8", 10" and 12" joists in 20 and 24 ft. lengths.

**Produce money-making concrete joists with the  
Kirk & Blum Heavy Duty Vibrating Table . . .**

Cash in on the ever-growing demand for steel-reinforced concrete joists. Your experience and contacts in the building trade should make it easy to build up a profitable business in this new line. Concrete joists are simple to make, have unusual strength, are termite proof. The KIRK & BLUM Type "S" Heavy Duty Vibrating Table is capable of multi-production of concrete joists, allowing a fine profit-margin. Easily produced by unskilled operators. For complete details and prices, write to The Kirk & Blum Mfg. Co., 2910 Spring Grove Ave., Cincinnati 25, Ohio.

**KIRK & BLUM**

Manufacturers of steel forms of all  
types . . . Curb, Gutter, Sewer, Road.

country, and the Coralville dam, both of which are directly under his jurisdiction and involve a variety of unique construction problems.

The Friday sessions included a discussion of ready-mixed concrete led by Charles W. Shirey of Waterloo, Iowa, past-president of the National Ready Mixed Concrete Association, and currently president of the recently organized Iowa association. Problems of job delivery and control, purchaser complaints, relationship with job foremen, dependability in deliveries and control of quality and consistency were among the aspects discussed by Mr. Shirey and others.

William Lerch, manager of applied research for the Portland Cement Association at Chicago, covered concrete durability problems, presenting recent data and illustrations from the extensive long-time tests in progress on the experimental "concrete farms," strategically situated throughout the country for varied types of exposure.

Friday afternoon was devoted to a demonstration-lecture by Stanton Walker, engineering director of the National Sand and Gravel and National Ready Mixed Concrete Associations. He was assisted by Professors Chamberlin and Munger of the College staff. On Friday evening a dinner, Prof. Chamberlin presiding, was followed by a forum and round-table discussion of questions previously turned in on cards at the sessions. In addition to program participants previously mentioned, the panel of experts included Charles E. Wuerpel, technical director, Marquette Cement Manufacturing Co., Chicago, and Fred F. Loy, district engineer, Portland Cement Association, Des Moines.

On Saturday forenoon Professor Frank Kerekes, assistant dean of engineering and chairman of the Iowa Building Code Council, discussed the proposed Iowa building code in its relation to concrete construction. Maurice Miller, vice-president, Hawkeye Portland Cement Co., Des Moines, supplemented the discussion of Dean Kerekes.

The closing paper of the session was given by Professor Chamberlin who summarized some of the more recent researches in concrete, after outlining the manner in which the research method is applied to running down specific effects of interdependent variables. Among other timely items, he was also able to present slides on some recent tests by Myron A. Swayze which showed strikingly the comparative effects of delayed curing, type of finishing and air entrainment on the resistance to freezing and thawing of concrete palleys.

Interest was high throughout and it seems probable that this type of conference will be continued on an annual basis. This particular one was unusual in the large amount of eminent, non-local talent present, an amount considerably in excess of what would normally be drawn upon for a local or statewide gathering.

# Farquhar TROUGH CONVEYOR DOUBLES PRODUCTION in CONCRETE BLOCK PLANT



**C**ARRYING a constant heavy load of wet concrete from mixer to block forming machine is a pretty rugged job, but this Farquhar Model 346-2 Trough Conveyor does it day in, day out, without a sign of weakening. And the users are plenty enthusiastic about this performance. "Our Farquhar Conveyor paid for itself in less than two years," they say, "and we have doubled our production as compared with previous hand methods!"

**For All Handling Jobs  
... in All Industries**

All through industry you'll find Far-

quhar Conveyors saving time, money and manpower... handling sharp and abrasive materials with the same ease and efficiency as fine powdery substances... and doing it *faster, easier, cheaper!* Contractors, chemical plants, warehouses, department stores, all industries, turn to Farquhar for answers to their specific materials handling problems. Farquhar offers you a complete line of conveyors for portable, semi-permanent or permanent use, to handle any and all kinds of loose or packaged materials. There's a Farquhar Conveyor that can save you money!



## FREE INFORMATION

A. S. FARQUHAR CO., Conveyor Division  
236 Duke St., York, Pa. or  
628A W. Elm St., Chicago 10, Ill.

Gentlemen:

Please send me complete information on the following:

☐ Farquhar Trough Conveyors ☐ Farquhar Package Conveyors

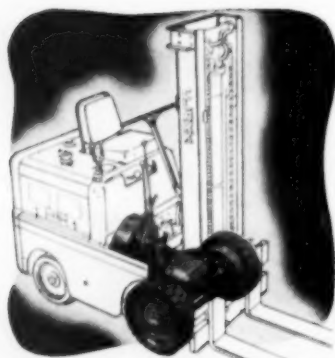
Name

Firm

City

Zone State

HYDRAULIC PRESSES • FARM EQUIPMENT • FOOD PROCESSING AND SPECIAL MACHINERY



**ONLY CLARK  
FORK TRUCKS**

have  
**TRANSMISSIONS**  
and **AXLES** made by  
**CLARK** and used for  
years in transportation  
equipment

**GOOD  
REASONS WHY  
CLARK IS  
YOUR  
"BEST BUY"**

*Lower your break-even point—by cutting these handling costs with the versatile, efficient, low-cost Clark Machines.*

*Many practical handling attachments broaden the usefulness of Clark fork trucks—good idea to know about them.*

**CLARK**  
ELECTRIC AND GAS POWERED  
**FORK TRUCKS**  
AND INDUSTRIAL TOWING TRACTORS



CLARK EQUIPMENT COMPANY - Battle Creek 68, Mich.  
Please send items checked... without obligation  
☐ Condensed Catalog ☐ Material Handling News

NAME \_\_\_\_\_

FIRM NAME \_\_\_\_\_

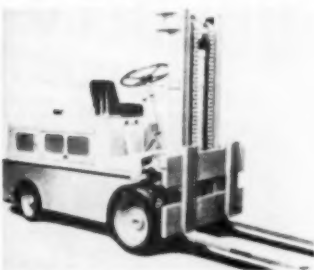
STREET \_\_\_\_\_

CITY \_\_\_\_\_ ZONE \_\_\_\_\_ STATE \_\_\_\_\_

## NEW MACHINERY

### Five-Ton Fork Lift Truck

CLARK EQUIPMENT Co., Battle Creek, Mich., has recently added a gasoline-powered fork lift truck of 5 ton capacity known as the Utilitrac-



Fork truck with magnetic field, air gap drive transmission

100. Power transmission of the new unit is through a Dynatork drive, which transmits power through a magnetic field, across an air gap, and eliminates any type of friction clutch as well as a conventional transmission, according to the designer.

Motive power for this truck is furnished by a Continental 6-cylinder industrial-type engine of 209-cu. in. displacement which develops 50 b.h.p. at 1800 r.p.m. Specifications include: 107-in. over all length, 50½-in. over-all width, 66-in. wheelbase, and an outside turning radius of 104 in.

### Increase Truck Mixer Size

CHALLENGE MANUFACTURING Co., Maywood, Calif., is now producing a 5-cu. yd. drum-type truck mixer or a 6-cu. yd. agitator, in addition to its former line of 3 cu. yd. models. Chief advantage claimed for these truck mixers is their lightweight construction: smaller models weigh 1500 lb. and the 6-cu. yd. units weigh 3000 lb. Power plant for the drum mixer is a Ford industrial engine, controlled through a clutch, transmission and

universal joint of the same manufacture. Worm drive of the drum is a Link-Belt product. According to the manufacturer this use of only standard and readily accessible industrial parts makes for ease of maintenance and repair.

### One-Ton Fork Lift Truck

BIDA Co., Harvey, Ill., announces operator-efficiency features of its newly designed models FA-20-24 and FPA-20-24 2000-lb. fork lift truck, which are: two speed forward and two speed reverse transmission; single hydraulic tilt-raise-lower control lever; and gear-shift levers mounted on the steering column. Both models are rated at 24-in. load center for greater lifting capacities which permit handling loads of 2220 lb. at 20-in. cen-



Fork truck with operator-efficiency features

ters and 2600 lb. loads at 15-in. centers. Collapsed height of the mast is 64½ in., and total lift is 85 in.

### Water-Repellent Coating

RANETITE MANUFACTURING Co., Inc., St. Louis, Mo., announced recently an improvement to its transparent, water-repellent coating for masonry walls above grade known as No. V. The new ingredient added to the coating is Poly-Siloxane. The company reports that the new No. V forms a coat over masonry walls to make them impervious to water, seepage or other dampness. The product is packaged in 1-, 5- and 55-gal. containers.



Six-cu. yd. transit mixer of new lightweight design

## Washington Masonry Producers Meet

THE CONCRETE PRODUCTS ASSOCIATION OF WASHINGTON held its annual Spring meeting on Saturday, March 18, 1950, at Seattle, with 55 members and guests attending. The morning session was devoted to association business and committee reports. A committee was appointed to make arrangements for the twenty-first annual three-day summer meeting.

Following lunch at the Engineers' Club, Safety Consultant R. M. Gilmore spoke on "Accidents Don't Just Happen" and presented a film, "Cause and Cure," which emphasized the need to know where hazards lie and how, through regular inspection, these can be reduced. Mr. Gilmore also commented on the accident reports turned in by the association members during the past several months and on the need to supply all the information on these reports if they are to be of value to the industry. C. M. Howard, association engineer, reported on the meetings of the California Associated Concrete Pipe Manufacturers and the American Concrete Pipe Association held in San Francisco during the week of February 22-25, 1950.

## Pumice Masonry

In their presentation, "Tests and Mix Designs of Pumice Masonry," J. J. Wegner and W. E. Cox, Washington State College, Division of Industrial Research, gave details of the work being carried on at the state college with pumice masonry. This preliminary report is a continuing study on panel walls and sets of block tested for dimensional change under varying temperature and moisture conditions. Graphs and charts also were presented showing the study on mix design requirements.

R. J. Cotter, the last speaker in the afternoon program, led a discussion on recommended construction details for concrete masonry and outlined basic building recommendations. These construction details will be incorporated into a loose leaf pamphlet for distribution to architects and builders.

The evening dinner meeting honored Messrs. James H. Robertson, R. B. Mason, and W. P. McNamara of the Seattle Engineering Department, with the principal entertainment being the showing of colored movies taken by Prof. F. H. Rhodes, Jr., University of Washington, during his trip to Mexico.

## Ready Mix Plant

M. N. PENNY has announced plans to construct a ready-mixed concrete plant on 16 acres located near the Santa Fe freight yards in Emporia, Kan. A railroad spur will be built to handle the company's materials. Mr. Penny now owns the Ready-Mix Concrete Co. in Lawrence.



# HELTZEL

## SUPERIOR Batching Plants

• More efficient batching plants will effect savings for you in operation and plant costs. Heltzel's specialized engineers work out your specific problems on both stationary and portable installations, ranging in capacities from 30 to 500 tons. Why not let a Heltzel representative explain exclusive features and Heltzel's better construction.

- CENTRAL MIX PLANTS
- TRANSIT MIX PLANTS
- BULK CEMENT PLANTS (Portable and Stationary)
- AGGREGATE BATCHING PLANTS (Portable and Stationary)
- CONCRETE BUCKETS



WRITE FOR  
BULLETIN

Heltzel Steel Form & Iron Company  
1750 Thomas Road  
Warren, Ohio, U.S.A.

Please send information regarding:

Stationary Batching Plants ☐ Road and Airport Forms ☐  
Portable Batching Plants ☐ Curb and Gutter Forms ☐

FIRM \_\_\_\_\_  
ADDRESS \_\_\_\_\_  
CITY \_\_\_\_\_ STATE \_\_\_\_\_  
SIGNED \_\_\_\_\_

**HELTZEL** STEEL FORM & IRON CO.  
WARREN, OHIO • U. S. A.



extra white

## TRINITY WHITE Portland Cement

Use Trinity—the whitest white cement. A true portland cement that meets ASTM and Federal specifications. Trinity is first choice for architectural concrete units, terrazzo, stucco, paint and other uses. Regularly advertised to architects and other factors in the industry. Gives a pure white and true colors when pigments are added. Ask for Trinity White. Trinity Division, General Portland Cement Co., 111 W. Monroe St., Chicago; Republic Bank Bldg., Dallas; 816 W. 5th St., Los Angeles.

as white  as snow



TRINITY WHITE  
is a  
*True Portland Cement!*

## NOW IS THE TIME / to equip . . . to sell the profitable lintel market

There's  
a  
**KENT  
LINTELATOR**

including the  
New Super,  
for every plant,  
large or small.

Get The NEW  
BULLETIN Just  
Off The Press



Can also  
be adapted  
to make SILLS,  
CRIBBING and  
FENCE POSTS

Yes, there's considerable extra business to get and increased profit to be made in lintels if you produce them fast and economically on a Kent Lintelator.

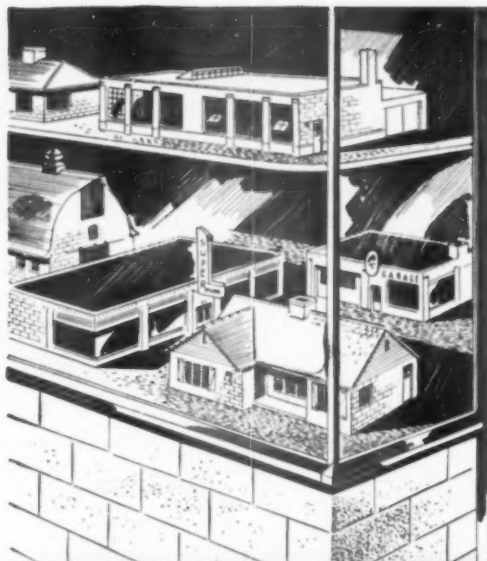
More and more block makers are proving this as indicated by enthusiastic reports. Several have installed additional machines.

Lintelator not only enables manufacturers to reach a ready market but expands this market through inherent advantages.

Lintels can match block texture. Any aggregate can be used. They're installed by masons. There's no delay or extra expense for steel erectors. Builders really like them and buy them in unexpected volume.

This is your big opportunity and NOW is the time to act. Write today.

*The* **KENT MACHINE CO.** Cuyahoga Falls, Ohio  
Manufacturers of CONCRETE PRODUCTS MACHINERY Since 1925



## Is your window display selling **CONCRETE MASONRY?**

Retail merchants know from experience that attractive window displays really sell goods.

Most concrete products manufacturers have no windows in which to display the long-lasting and economical buildings made from their products. Yet, each community has many examples of quality concrete masonry structures. These buildings are, in effect, the real window displays of the concrete products manufacturers.

Promotion-minded concrete products manufacturers, being aware of this, keep a list of the best homes, stores, garages, factories and farm buildings at their fingertips. Such a list enables them instantly to select good examples to show to a prospective owner or his builder or architect when he inquires about concrete masonry construction. Every good job so promoted helps sell others and, like the retail window display, builds business.

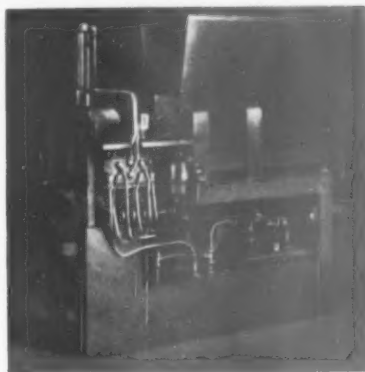
Such effective promotion is one of three essential ways to build business. The others are: (2) making quality block that complies with ASTM and Federal specifications for moisture content, strength and water absorption and (3) recommending only contractors and builders who can be depended on to deliver quality concrete masonry construction.

## **PORTLAND CEMENT ASSOCIATION**

33 W. Grand Avenue, Chicago, 10, Illinois

A national organization to improve and extend the uses of portland cement and concrete...through scientific research and engineering field work

## **BLOCK MACHINE EFFICIENCY AT ITS PEAK POINT**



*The  
New,  
Revolutionary*

## **HYDRO-KORPAK**

At last comes a block machine of streamlined compactness that brings low-cost automatic production within reach of men of modest capital. One that combines the four major objectives of scientific compacting... hydraulic operation, electrically controlled... one-man labor... and moderate price. All in order to produce a super-fine block — marked by the utmost in accuracy, smoothness and density — at remarkably low production costs. † Among the outstanding construction highlights is lateral compacting, whereby swiftly oscillating cores pre-densify the material in advance of the final intensive squeeze exerted by the powerful hydraulically operated ram. Thus is combined the combination of lateral and vertical packing, with uniform density in every cubic inch. † Regularly equipped to make nominal 8 x 8 x 16" in full and fractional sizes. Attachments available for four other thicknesses: 4", 6", 10", 12". Modular conformation in all dimensions, but can be supplied for making the old standard sizes. † Finely engineered. Precision built. Evidence of rugged construction is a gross weight of more than 2½ tons. Compactness is shown by over-all dimensions of 90 inches long by 53

*The Superfine Block*



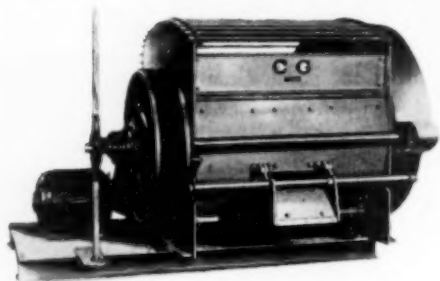
inches wide. Fully self-contained. † Write for copy of the new descriptive catalog.

**CONCRETE  
EQUIPMENT COMPANY**

561 Ottawa Ave., Holland, Mich.

## THE FAMOUS C. G. MIXER

Sizes . . 14 . . 24 . . 36 . . 50 of capacity



Equipped with . . .

Abrasion Resisting steel liners  
Seal Master Ball Bearings  
Famous Lemley clutch  
Motor and V. belt drive or  
clutch pulley drive

Write for literature and prices

**CHAS. GATZKE MFG. CO.**

930 North Avenue . . . Des Plaines, Illinois

**MANUFACTURE THIS BEAUTIFUL  
CONCRETE OUTDOOR FIREPLACE**  
Right In Your Own Backyard

\$4.00 Worth of  
Sand & Cement  
produces this  
Attractive  
Fireplace.



Sells on Sight from  
\$60 to \$80. Easy to  
start your own Pro-  
fitable Business.

The General Fireplace Molds and  
Process are the most amazing and foolproof  
ever invented. Simple to operate, two men can produce five fireplaces a day.

**BIG DEMAND!!**

Sell all you produce to Department Stores, Homeowners, Parks, Nurseries and  
Public Graves. Fireplaces sell on sight. No experience necessary, we supply  
full operating instructions and equipment plus the know how that spells BIG  
PROFITS. This is an outstanding opportunity for men of vision and small capital  
to get into a busy rich paying field. Don't delay, be the only exclusive  
manufacturer in your own home town. Mail coupon at once for full details or  
to have you can reserve your territory.

**GENERAL ENGINES CO., Inc.**

307 HUNTER ST. •

Mr. Tar of Phila. writes:

Sold 250 in first 4 months. Selling to  
Sears Roebuck, John Wanamaker  
and Gimbel Bros. in Phila. area.

GLOUCESTER CITY 10, N. J.

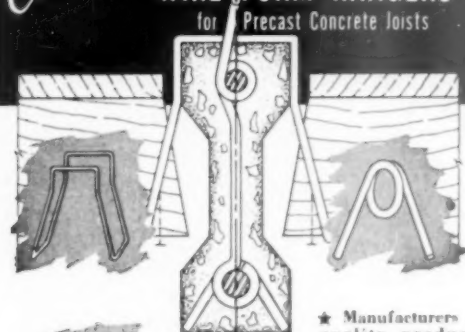
Name \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ Zone \_\_\_\_\_ State \_\_\_\_\_

the new

*Centered* **STIRRUPS AND CHAIRS,  
WIRE FORM HANGERS**  
for Precast Concrete Joists



★ Manufacturers of  
quality products  
used to reinforce  
and support the reinforcing bars in  
precast concrete joist fabrication.  
Wire Form Hangers made of No.  
11 gauge wire provide a faster  
method of floor installation.

"Specials" made on request.

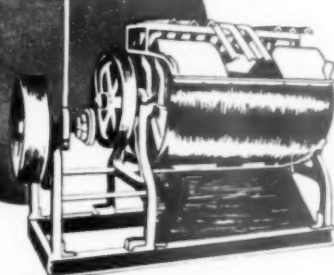
Literature, Prices or samples on request



**AUTOMATIC SPRING COILING CO.**

4049 WEST THORNDALE AVE., CHICAGO 30, ILL.

**BLYSTONE  
MIXERS**



**BACKED** by more than 35 years of spe-  
cialized experience, BLYSTONE Mixers offer  
five basic advantages for a wide variety  
of concrete work: 1—Low Initial Cost;  
2—Low Mix Cost; 3—Thorough Mix;  
4—Easy Operation; and 5—Sturdy Con-  
struction.

Write for complete details.

**BLYSTONE DIVISION  
STANDARD SAND AND MACHINE CO.**

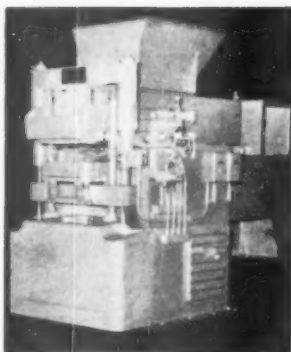
549 W. Washington Boulevard • Chicago 6, Illinois

**YOU'LL MAKE MORE BLOCKS  
WITH A *Columbia!***

**HERE'S  
WHY**

- PLAIN PALLETS
- VIBRATION PLUS COMPRESSION
- 4-6 AND 8 INCH HIGH BLOCKS
- 4 TO 6 PALLETS PER MINUTE
- OIL HYDRAULIC
- ANY TYPE OF AGGREGATE
- AUTOMATIC OR SEMI-AUTOMATIC

• WRITE TODAY  
FOR COMPLETE  
INFORMATION!

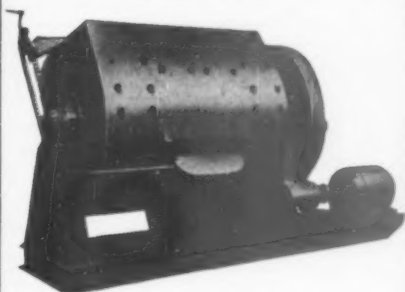


***Columbia* MACHINE WORKS**  
105 MAIN STREET • VANCOUVER, WASHINGTON

FMC 100 **BLOCK MACHINES** FMC 180

## THE FMC-24

supplied as  
2 sack or 3 sack  
Standard Model Deluxe Model  
PLANT MIXER



Priced as a TWO sack Mixer  
with THREE sack Drum  
and Gear Reduction Capacity

FOR PRICES AND DETAILED INFORMATION WRITE

—FLEMING MANUFACTURING CO., INC.

COMPLETE

CONCRETE BLOCK PLANT EQUIPMENT

4987 Fyler Avenue

St. Louis 9, Mo.

**LITH-I-BLOCK**

A TWO OR THREE-BLOCK PLAIN  
PALLET AUTOMATIC MACHINE

FEW MOVING PARTS — LOW MAINTENANCE — DEPENDABLE OUTPUT OF  
8 OR 12 PRECISION BLOCK PER MINUTE

*Write* **LITH-I-BAR COMPANY**  
HOLLAND, MICH. DEPT. CP3

**PALLETS**

**24** Page Catalogue

*Every Block  
Maker*

SHOULD HAVE ONE

*Shows a  
Complete Line of  
STEEL  
CORED  
PALLETS*

*Write for it — FREE*

**THE COMMERCIAL SHEARING & STAMPING CO.**  
P. O. BOX 719 YOUNGSTOWN 1, OHIO

# CLASSIFIED ADVERTISING

## READY-MIXED CONCRETE AND CONCRETE PRODUCTS EQUIPMENT

Single insertion rate \$10.00 a column inch. Larger insertions at lower rates; request Concrete Products Classified rate card. POSITIONS WANTED and

POSITIONS VACANT (not display ads) \$1.00 a column inch an insertion. Terms: Cash with order except contract advertisers who are billed monthly.

### FOR SALE

## TRADE ♦ SWAP ♦ SELL

1—Stearns Jettro No. 9 Complete Less Base \$250.00  
3—MORE STEARNS Clipper Striper Block Machines—Each 750.00  
1000 Solid Steel 8" Pallets—Each .20  
1000 Solid Steel 4" Pallets—Each .10  
100 Chase Racks, FOB N. Carolina—Each 15.00  
1—LEWIS SHEPARD Rubber Tired Lift Truck in Brand New Condition 700.00  
1—F. C. George Block Machine 700.00

**GENERAL ENGINES CO., INC.**  
307 HUNTER STREET  
GLOUCESTER, N. J.

Write, Wire, or Phone Gloucester 4-2899  
Cable Address: Generaleng, Gloucester, N.J.

1—STEARNS 28 Cu. Ft. Concrete Mixer Brand New Condition, New Blades, Etc. Complete with Motor \$1500.00  
1—Kong Tamper 500.00  
50—Hinged Racks—Each 15.00  
2—Pallet Dumpers—Each 35.00

THOUSANDS OF STEEL AND ALUMINUM PALLETS IN STOCK; ALL SIZES.  
SEND TRACING FOR QUOTATION.

WE WILL TRADE, BUY, SWAP, OR SELL YOUR USED EQUIPMENT.  
SEND US LIST OF YOUR USED EQUIPMENT.  
HIGHEST PRICES PAID FOR GOOD EQUIPMENT.

### WE OWN THE EQUIPMENT WE ADVERTISE

#### FOR SALE

Korpak and HydroKorpak Vibrator Block Machines, 16" Mixer, Ship Hoist, Truckman Lift Truck, Drag Line, Winch, Other Equipment

**VAN VOORST BROS.**  
P.O. Box 18 Holland, Mich.

#### FOR SALE

1948 Lith-I-Block Machine with all attachments 2500—18x18x1/4 steel pallets, 60—72 Block Racks. Can be seen in operation this month. We are getting larger machine.

**S & C ENTERPRISES, INC.**  
300 E. Fillmore, Colorado Springs, Colo.

1—Flam No. 3 Challenger and Accessories  
5—Mold boxes—Various sizes  
20—Steel Racks  
1000—Wood Pallets  
1—10 H.P. boiler and fittings  
Good condition—Very reasonable  
Write

**REMBAC'S BLOCKYARD**  
P.O. Box 709 Visalia, California

#### TRANSIT MIXERS

1—Ransome 4 1/2 yd. Horitz Transit Mixer, Mounted Sterling Diesel Truck  
1—Smith 2 yd. Used H. Discharge Mixer mounted on Diamond T COE Truck  
1—Rex "16" 81ightly used mixer.

**EIGHMY EQUIPMENT COMPANY**  
Rockford, Ill.

#### PACKER-HEAD WINGS

McCacken Type—PROVED in last as long as longer—yet cost considerably less. Write for prices.

**TEXAS FOUNDRIES**  
LUFKIN, TEXAS

#### FOR SALE

Dumperette mounted on Model C 40 International Truck. Used very little. Will sell cheap.

**SAGER CONCRETE PRODUCTS**  
1139 S. Dettman Rd. Jackson, Mich.

#### FOR SALE

Leahy No Blind Double Deck Vibrating screen, size 3'x6', with 220 volt—3 phase motor mounted thereon.

**Blairville Concrete Products Co.**  
Blairville, Pennsylvania

Lith-I-Block Machine 8" and 4" attachments. Good condition, available now.  
Also F. C. George Semi-Automatic Hydraulic block machine—20 ft. Conveyor, practically new 25 cu. ft. mixer with 15 H.P. motor.  
All at bargain, write or wire

**KING CONCRETE PRODUCTS**  
P.O. Box 2304 Jacksonville, Fla.

#### FOR SALE

Dodson 18 cu. ft. Skip Hoist complete with 3 H.P. Motor and Winch—3 years old—Excellent condition—\$500.00 or best offer.

**GROSS BLOCK & TILE WORKS**  
200 1st St. S.E. Milford, Iowa

#### FOR SALE

Crushed and sized cinder aggregate, tested and approved for the manufacture of cinder blocks. Write:

**DULUTH CINDER SLAG & STONE CO.**  
Box 116 Duluth 7, Minn.

#### FOR SALE

1—No. 7 Jettrocrete Block Machine Complete with all motors and automatic switches. New Spare Parts, 4"-6"-8" and 12" Mold boxes. Equipment in good condition. All for \$2100.00.  
2200—4" Steel Pallets 15c 2200—6" Cast Iron Pallets 15c 2200—8" Steel Pallets 30c each. Above is less than 1/3 list on new equipment.

1—Miles Face Down Block Machine makes 6" and 8" Blocks. Attachments to make Rock Face Blocks 14" mixer and elevator, 400 New Wood Pallets all in good condition all for \$750.00  
Phone or Write

**WEBLE BLOCK CO.**  
Scottsboro, Ala.

#### FOR SALE

Stearns 28 ft. mixer and vertical skip.

**EDWARD CAMPBELL CO.**  
East & Walnut Vineland, N. J.  
Phone Vineland 9-7285

1 Stearns No. 7 Automatic Striper  
1 Stearns 18 ft. mixer  
2250 8"x16" pallets  
1500 10"x16" pallets, new  
Chimney block machine, 16x16", 64 pallets 14 ft. conveyor  
Machines equipped individual 3 phase motors  
**Arthur Dyer, R.F.D. 2, Endicott, N. Y.**

#### FOR SALE

Used, Concrete Equipment Co. of Holland, Mich., Success Power Block Machine, with complete molds. Also 25 metal racks of 48 regular block capacity. Details on request.

**CAMERON JOYCE & SCHNEIDER**  
Keokuk, Iowa

#### FOR SALE

2500—8" Full width steel pallets, Dacott 44 cents each. One Kelley 30 ft. mixer with built on Vibrating screen \$1500.00. 40 steel racks, 60 block capacity \$15.00. One George Hydraulic, best offer, sell all or part.

**JOHN J. YELLEN**  
381 Jeffries St. Perth Amboy, N. J.

#### FOR SALE

200 gal. Blaw Knox Water Weighing Tank 3 Beam Scale, complete with floor spout. New condition—\$450.00 f.o.b. Dothan, Ala.

**SPEIGNER CONCRETE BLOCK CO.**  
Dothan, Ala.

#### FOR SALE

900 cast iron pallets 7 3/4"x 15 3/8"x3 3/4". In good condition

**Ben Wanders, R.R. 3, Allegan, Mich.**



## FOR SALE

### UNBREAKABLE PALLET RINGS

Write for full information  
TEXAS FOUNDRIES  
LUPKIN, TEXAS

## CEMENT COLORS

### CONCRETE BRICK COLORS CEMENT COLORS MORTAR COLORS

made by  
BLUE RIDGE TALC CO., INC.  
Henry, Virginia

**CEMENT COLORS**—Write for samples and prices of "LANSCO" CEMENT COLORS in bright shades of RED, YELLOW, GREEN, BLUE, BLACK, BROWN. Manufactured by

LANDERS-SEGAL COLOR CO.  
73 Delavan St. Brooklyn 31, N. Y.

## CINDERS FOR SALE

### ANTHRACITE CINDERS

A car load or a train load. Our supply is unlimited. Processed ready to use. Locations on Baltimore & Ohio, Pennsylvania, and Lehigh Valley Railroads. Call or write

ROY P. MCMINDES COMPANY  
105 Mece Avenue Baltimore 21, Md.  
Phone: Essex 179

## EQUIPMENT WANTED

### WANTED CRUSHER ROLLS 36" DIA.; 30" FACE

CHAS. SVEC, INC.  
5470 Dunham Rd., Maple Heights, O.

## BUSINESS OPPORTUNITIES

**FOR SALE**  
COMPLETE CONCRETE BLOCK PLANT. Well established and in operation. Old est and second largest in large Southwest City of 120,000 pop. Established in 1945. New equipment in 1949. Ill health reason for selling. Reasonable. Box 158, Rock Products, 309 W. Jackson Blvd., Chicago 6, Ill.

## POSITIONS WANTED

Chemical Engineer with 15 years experience as Engineer in Portland Cement, Sand and Gravel and Ready Mix Industries desires position as engineer or plant superintendent. Fluent Spanish, South American, California or South West location preferred. Box 156, Rock Products, 309 W. Jackson Blvd., Chicago 6, Illinois.

## SPEAK NO EVIL



The rumor-monger is himself an evil, but only a monkey seals his lips against reality. And cancer is a grim reality. We must discuss the facts of cancer in order to help educate and protect our neighbors. For humanity's sake—and our own preservation—we must support the crusade against this mortal enemy of man.

## GIVE TO CONQUER CANCER

### AMERICAN CANCER SOCIETY

# FREE SERVICE for BUYERS

Here is the quick way to get information and prices on machinery and equipment. Just check the item (or items) listed below about which you desire information. Then send this page to us, and we will take care of the rest.



TEAR OFF HERE



Admixtures, Aggregate  
Aftercoolers, Air  
Aggregates (special)  
Air Compressors  
Air Separators  
Asphalt Mixing Plants  
Bagging Machines  
Bags  
Barges  
Batchers  
Belting, Conveyor,  
Elevator, Power  
Transmission  
Belting, V-Type  
Belt Repair Equipment  
Bin Level Indicators  
Bins and Batching  
Equipment  
Blasting Supplies  
Block Machines  
Concrete Building  
Bedding, Trailer  
Brick Machines and  
Molds  
Buckets  
Buildings  
Cage, Industrial

Classifiers  
Clutches  
Coal Pulverizing  
Equipment  
Concentrating Tables  
Concrete Mixers  
Concrete Mixing  
Plants  
Concrete Specialty  
Molds  
Concrete Waterproof-  
ing and Dampproof-  
ing  
Conveyors  
Crushers  
Coolers  
Cranes  
Derricks  
Dewatering Equip-  
ment, Sand  
Diesel Engines  
Dragline Cableway  
Excavators  
Draglines  
Dredge Pumps  
Drilling Accessories  
Drills

Dryers  
Dust Collecting  
Equipment & Sup-  
plies  
Electric Motors  
Engineering Service,  
Consulting and De-  
signing  
Explosives & Dynamite  
Fans and Blowers  
Flotation Equipment  
Gasoline Engines  
Gear Reducers  
Generator Sets  
Grinding Media  
Gypsum Plant Ma-  
chinery  
Hard Surfacing Ma-  
terials  
Holes  
Hoppers  
Kilns; Rotary, Shaft,  
Vertical

Locomotives  
Lubricants  
Mills  
Pulverizers  
Pumps  
Seals  
Screen Cloth  
Screens  
Scrubbers; Crushed  
Stone, Gravel  
Shovels, Power

Speed Reducers  
Tanks, Storage  
Tractors  
Trucks, Industrial  
Trucks, Mixer Body  
Trucks, Motor  
Vibrators  
Welding & Cutting  
Equipment  
Winches  
Wire Rope

If equipment you are in market for is not listed above, write it in the space below.

Send to:

### Research Service Department ROCK PRODUCTS

309 W. Jackson Blvd. Chicago 6, Illinois

Your Name \_\_\_\_\_ Title \_\_\_\_\_  
Firm Name \_\_\_\_\_  
Street \_\_\_\_\_  
City \_\_\_\_\_ State \_\_\_\_\_

CP-5

# CHOICE CUTS

*Executed  
with Neatness and Dispatch*

on the

## ZIPSAW

Block, brick, roof tile and other concrete units are cut cleanly, squarely and quickly. No more scoring, chiseling and hammering. You can zip through the hardest concrete in a hurry, whether the cuts are straight, diagonal or bevel.

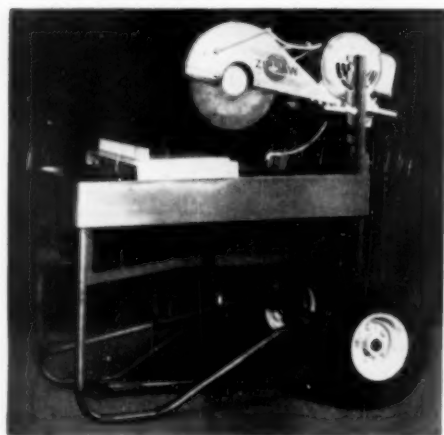
The Zipsaw is compact, self-contained and easily transportable. Extension hitch supplied for quick attachment to rear of automobile. Hides easily on big pneumatic tires. Smartly printed for eye appeal.

Easy pedal control leaves both hands free. Cuts wet or dry. Built in motor system with full vision of supply. Ball bearing work table. Four pivot positions. Flexible adjustable—versatile. Completely enclosed standard 1½ H.P. single-phase motor. V-belt transmission. Priced within reach of every concrete products manufacturer. Write for descriptive literature.

## Concrete Equipment Co.

502 Ottawa Avenue

Holland, Michigan



### INDEX TO ADVERTISERS IN THE CONCRETE PRODUCTS SECTION OF ROCK PRODUCTS ALSO SEE INDEX OF ROCK PRODUCTS SECTION ADVERTISERS ON PAGES 168, 169

Appley, J. W., & Son, Inc.	123
Automatic Spring Coiling Co.	148
Besser Mfg. Co.	141
Blairsville Concrete Products Co.	150
Blaw-Knox Co.	137
Blue Ridge Talc Co., Inc.	151
Butler Bin Co.	126
Cameron Joyce & Schneider	150
Campbell, Edw., Co.	150
Carpenter Mfg. Co.	138
Clark Equipment Co.	144
Clipper Mfg. Co.	140
Columbia Machine Works	149
Commercial Shearing & Stamping Co.	149
Concrete Equipment Co.	147, 152
Concrete Machinery Co.	142
Duluth Cinder Slag & Stone Co.	150
Dyer, Arthur	150
Eighmy Equipment Co.	150
Farquhar, A. B., Co.	143
Fleming Mfg. Co., Inc.	149
Gatzke, Chas., Mfg. Co.	148
General Engines Co., Inc.	148, 150
Gross Block & Tile Works	150
Heltzel Steel Form & Iron Co.	145
Horn, A. C., Co., Inc.	135
Jaeger Machine Co.	139
Johnson, C. S., Co.	124, 125
Kent Machine Co.	146
King Concrete Products	150
Kirk and Blum	142
Koehring Co.	124, 125
Landers-Segal Color Co.	151
Lith-I-Bar Co.	149
Master Builders Co.	153
Maxon Construction Co., Inc., Dumcrete Div.	138
McMindes, Roy P., Co.	151
Mischo Corp.	123
Multiplex Machinery Corp.	133
Portland Cement Association	147
Rembac's Blockyard	150
Sager Concrete Products	150
S & C Enterprises, Inc.	150
Smith, T. L., Co.	122
Speigner Concrete Block Co.	150
Standard Sand & Machine Co., Blystone Div.	148
Stearns Mfg. Co., Inc.	154
Svec, Chas., Inc.	151
Texas Foundries	150, 151
Trinity Division, General Portland Cement Co.	146
U. S. Steel Corp.	120
Universal Atlas Cement Co.	120
Van Voorst Bros.	150
Waanders, Ben	150
Weble Block Co.	150
Yellen, John J.	150



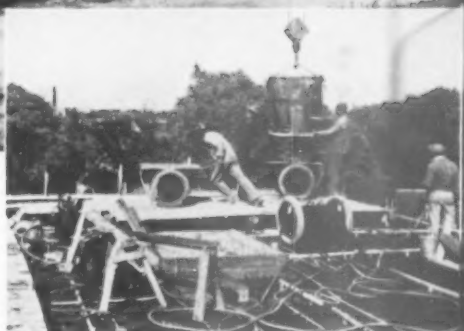
University of Tennessee —  
Men's Dormitory, Knoxville, Tenn.;  
Archts. — Barber & McMurry;  
Gen'l. Contr. — V. L. Nicholson Co.;  
Pozzolith Ready-Mixed Concrete —  
Tennessee Concrete & Supply Co.;  
all of Knoxville, Tenn.

## Quality PLUS Economy WITH POZZOLITH READY-MIXED CONCRETE

- ① GOOD WORKABILITY WITH LOW SLUMP
- ② MINIMIZED SEGREGATION
- ③ ASSURED STRENGTH
- ④ WATERTIGHTNESS
- ⑤ DURABILITY

These are the immediate and long-term benefits obtained in this project with Pozzolith, Cement Dispersion. Providing quality with economy, they explain why Pozzolith Ready-Mixed Concrete is going into more and more of America's finest structures.

Write for full information and Pozzolith booklet.



### POZZOLITH AUTOMATIC DISPENSER

Operator delivers the correct amount of Pozzolith, in liquid form, required for a batch, by simply setting the control dial and opening the valve.

Over 400 leading ready-mix and many concrete products plants are now equipped with this device.

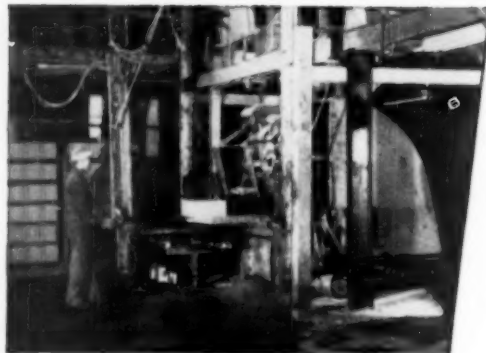
**the MASTER BUILDERS**

CLEVELAND 3, OHIO

TORONTO, ONTARIO

# STEARNS 15

*The record speaks for itself!*



Here is the completely automatic, new Stearns 15 Concrete Block Machine. Nick De Vries, manager of E. De Vries and Sons, writes about, working smoothly, efficiently, profitably, with *but one operator* in the Grand Rapids, Michigan, plant. Utilizing Stearns' startling innovation in concrete and cinder block manufacture—the new, Dual-Shaft, Unidirectional, Vibrating Unit, now a part of all Stearns vibrating equipment—this far-famed machine is replacing two others of lower production rates in a continuing program of modernization and expansion.

The modern, cinder block office of E. De Vries and Sons at 1400 Walker Avenue, N. W., Grand Rapids, Michigan—a perfect match for the plant! Thirty-three-year-old pioneers in the Western Michigan Building Industry, first and largest manufacturer of cinder blocks and largest producer of brick mortar sand in its area, the De Vries concern today extends over eight and one half acres.

Stearns Manufacturing Company,  
Adrian,  
Michigan.

December 17, 1949.

Gentlemen:

It is now over three months ago since we began operating our new STEARNS No. 15 Block Machine. During that time we have had a good opportunity to discover its production capacity, and its working efficiency. During this time we have produced almost 400,000 eight inch cement and cinder blocks, or their equivalent. Considering that this has been done with the use of only one operator, working one shift, five days a week, we believe that this is a pretty good production record.

We thought you might like to know that the record of the machine has verified all the claims which your representative, Mr. Rowell, made for it.

Very truly yours,  
E. DE VRIES AND SONS,

Per: *Nicholas De Vries*



**PERFORMANCE IS PERFECTION  
...PERFECTION IS PROFIT!**

**MODERNIZE!**

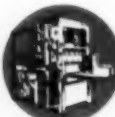
# STEARNS

MANUFACTURING COMPANY • INC

ADRIAN • MICHIGAN



STEARNS 15



STEARNS 50



JOLTCRETES



CLIPPER STRIPPERS



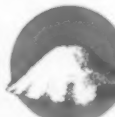
MIXERS



SKIP LOADERS

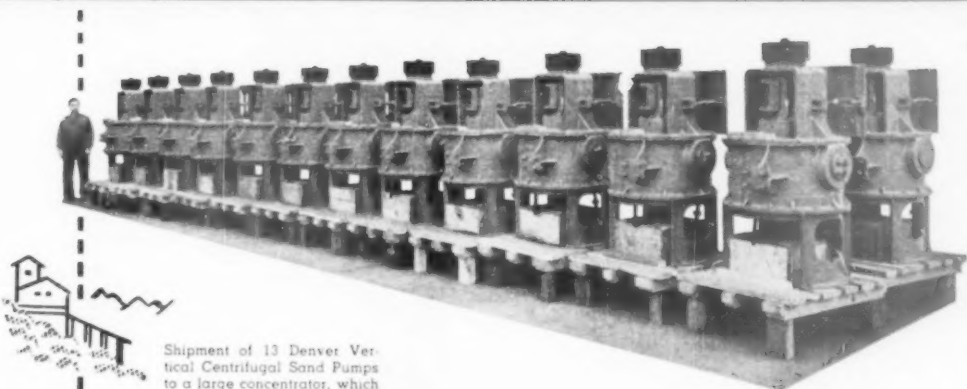


TURNTABLES



SINTERLITE

# WHY LARGE COMPANIES USE . . . *DENVER Vertical Centrifugal SAND PUMPS*



Shipment of 13 Denver Vertical Centrifugal Sand Pumps to a large concentrator, which now has 47 in its flowsheet.

## HIGH EFFICIENCY—SELF PRIMING

The constant feed by gravity from the pump bowl to the pump runner results in pumping at maximum efficiency at all times. As long as there is pulp in the bowl, the runner pumps a full load. The pump is self priming due to this gravity flow principle. There is no suction head to cause air locks.

## HANDLES COARSE MATERIAL

The downward feed directly on top of the pump runner permits pumping coarse feeds and other difficult-to-handle material without clogging the pump. . . Ideal for pumping flotation concentrates. . . Feed sizes up to  $\frac{3}{4}$ " are easily handled.

## NO FEED BOX OR INTAKE HEAD REQUIRED

The pump bowl acts as the feed box and no intake head is required . . . the feed flows by gravity into the pump bowl and down onto the runner.

## NO PACKING GLAND—NO SEALING WATER

The design of the Denver Vertical Centrifugal Sand Pump eliminates the troublesome packing gland. Maintenance and lost time are reduced as there is no packing to replace. No sealing water is required.

## AVAILABLE IN SIX SIZES

The Denver Vertical Centrifugal Sand Pump is made in  $\frac{3}{4}$ ", 1",  $1\frac{1}{2}$ " 2", 3", and 4" sizes, providing a wide range of capacities.



### FLotation ENGINEER

DENVER • NEW YORK • CHICAGO • EL PASO

TORONTO • VANCOUVER • MEXICO, D. F.

LONDON • JOHANNESBURG • RICHMOND, AUST.

*"The firm that makes its friends happier, healthier, and wealthier"*

**DENVER EQUIPMENT COMPANY**

1410 SEVENTEENTH STREET • DENVER 17, COLORADO



As part of a complete line of equipment DECO has a pump to meet every pumping problem. Further information will gladly be furnished on request.



*the fast,  
low-cost way  
to get  
worn teeth  
back in service!*



1. Worn tooth . . . 2. Plus AMSCO Tooth Repointer . . . 3. Equals like-new tooth—ready for service!

## AMSCO<sup>®</sup> tooth repointers



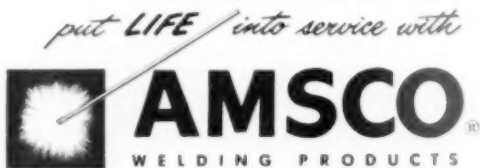
AMSCO Repointer Bars

5 teeth partially rebuilt with AMSCO Repointer Bars to show sectional view of welding method. These Repointer, or Wedge Bars, are also made in many shapes and sizes. Apply AMSCO Economy Hardface to the rebuilt tooth—for as much as 3 times longer service!

● Here's a typical example of a badly worn dipper tooth completely restored to service . . . simply by welding on the AMSCO Cast-To-Size Tooth Repointer. The result is like-new service life and efficiency, plus a long-wearing tooth of Manganese Steel—the steel that actually work-hardens in service. Cost? *Far less than replacement!*

Wherever equipment has teeth that wear, more and more owners are using money-saving AMSCO Tooth Repointers . . . available in a wide variety of styles and sizes.

Get all the facts! Write today for Bulletin W-10-A  
—showing complete instructions for use.



AMERICAN

**Brake Shoe**

COMPANY

**AMERICAN MANGANESE STEEL DIVISION**

377 EAST 14th STREET • CHICAGO HEIGHTS, ILL.



## Scalping Oversize from a "River" of Silica Sand...

OTTAWA SILICA CO. uses water to move sand in this Illinois sand pit operation. Tons of silica sand are flushed by water in sluiceways and pipe lines from the working face to this 4 x 8 ft Low-Head screen.

The screen removes all plus 1/8-in. lumps ahead of the pump sumps and has proven a practical, low cost way to scalp the huge tonnages of sand and water involved. Operators are pleased with the very small amount of maintenance required.

Low-Head screens are money-savers for a variety of dewatering and sizing applications. Here are a few reasons why:

► Horizontal operation saves headroom,

reduces installation costs.

► Entire screen body "stress-relieved" to eliminate strain around welds.  
► Can be suspended by cables or floor mounted on rubber supports.

Allis-Chalmers builds six separate types of vibrating screens—a complete line for every application from heavy duty scalping of quarry-run stone to fine mesh separations.

There is an Allis-Chalmers representative near you who will gladly look over your operations, show you exactly where and how you may be able to reduce your operating costs with proper screening equipment.

A-2942

ALLIS-CHALMERS, 975A SO. 70 ST.  
MILWAUKEE, WIS.

Low-Head and Texrope are Allis-Chalmers trademarks.

# ALLIS-CHALMERS

Sales Offices in Principal Cities in the U.S.A.; Distributors Located Throughout the World.

IT PAYS TO SPECIFY MOTORS...  
CONTROLS...V-BELT DRIVES—ALL  
FROM ALLIS-CHALMERS



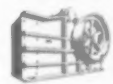
Motors — Controls



Texrope Drives



Vibrating Screens



Jaw Crushers



Kilns, Coolers, Dryers



Gyratory Crushers



**Reliable,  
Long-Lasting LINK-BELT  
Malleable Iron  
and Promal  
Elevator  
Buckets**



You can depend on Link-Belt elevator buckets to carry your material efficiently . . . and moreover give long-lasting service. Buckets are accurate in shape and dimensions and their strong, smooth, seamless, uniform construction and correct design, assures proper filling and clean discharge. They have reinforced corners and are resistant to rust and corrosion. Available in various sizes, capacities and styles. Contact your nearest Link-Belt Office.

11-387

**LINK-BELT COMPANY**

Chicago 9, Indianapolis 6, Philadelphia 40, Atlanta, Houston 1, Minneapolis 5, San Francisco 24, Los Angeles 33, Seattle 4, Toronto 8, Johannesburg. Offices, Factory Branch Stores and Distributors in Principal Cities.

**FLEXCO**

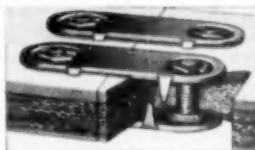
®

**BELT  
FASTENERS  
and RIP PLATES**



**FOR HEAVY  
CONVEYOR  
AND  
ELEVATOR  
BELTS OF  
ANY WIDTH**

- ★ FLEXCO Fasteners make tight butt joints of great strength and durability.
- ★ Trough naturally, operate smoothly through take-up pulleys.
- ★ Distribute strain uniformly.
- ★ Made of Steel, "Monel," "Everdur." Also "Promal" top plates.
- ★ FLEXCO Rip Plates are for bridging soft spots and FLEXCO Fasteners for patching or joining clean straight rips.



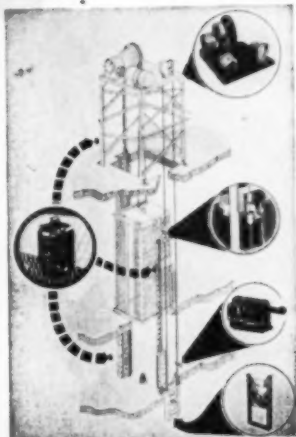
*Compression Grip distributes strain over whole plate area*

Order From Your Supply House. Ask for Bulletin F-100

**FLEXIBLE STEEL LACING CO.**

4684 Lexington St., Chicago 44, Ill.

**save time . . . save money with  
EHR SAM ELECTRIC MANLIFTS**



Rapid, inter-floor transportation for your employees means more productive time. More production means more profit. Illustrated here is the electric operated, cage-type manlift made in 300 lb. and 500 lb. capacity. Other types available. Reasonable installation costs bring you real savings. Write today for complete information.

**THE J. B. EHR SAM & SONS**  
*Manufacturing Co.*

ENTERPRISE,

Established 1871

KANSAS U.S.A.

**JOIN  
11,895  
PRODUCERS  
WHO  
REGULARLY  
READ  
ROCK  
PRODUCTS**



**COLUMBIA ROCK PRODUCTS**, Columbia, Tennessee, uses a Pioneer 30" x 42" Jaw Crusher as a primary breaker for its completely equipped Pioneer plant. This company produces road rock, ballast and agricultural limestone.



**THIS NEW ORE WASHING PLANT**, located on the Mesabi Range near Hibbing, Minnesota, uses a Pioneer 30" x 42" Jaw Crusher. This is only one of many Pioneer Jaw Crusher installations in the mines.

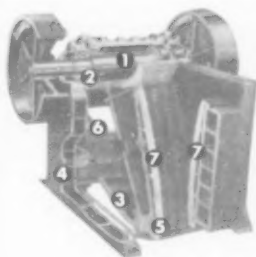
## Gives larger rock a better break!

**ARE** you crushing limestone, flintrock, granite, or tough trap? There's a Pioneer Overhead Eccentric Jaw Crusher that will give your larger rocks a better break—deliver more tons per crusher dollar, with less maintenance per ton.

The huge opening on a Pioneer Jaw Crusher takes larger rocks with ease—saves man-hours and dynamite. For example, the Pioneer 30" x 42" Jaw Crusher operated by H. E. Sargent of Vasselboro, Maine, can handle the largest rock that will pass through the bucket of a two yard shovel. Sargent has crushed as much as 1600 tons in a 10 hour day!

Compared to other types of primary crushers of equal capacity, the Pioneer Overhead Eccentric Jaw Crusher sells for considerably less. In fact, dollar for dollar, a Pioneer Jaw Crusher outproduces any other type of primary crusher on the market today.

For more information on Pioneer crushing equipment, drop the coupon in the mail today. **PIONEER ENGINEERING WORKS**, 1515 Central Avenue, Minneapolis 13, Minnesota.



- 1. OVERHEAD ECCENTRIC ACTION** forces material down and through as it is crushed, increasing capacity.
- 2. EXCLUSIVE MOUNTING** places SKF bearings closer together than on any other anti-friction primary, reducing strain on the shaft.
- 3. TOGGLE PLATE** holds lower end of the pitman at proper setting, and protects crusher from damage.
- 4. DOUBLE-WALLED, WELDED STEEL BASE** combines rugged strength with light weight.
- 5. MOVING JAW PLATE** has overhanging lip to protect cast steel pitman.
- 6. FULLY ENCLOSED, DUST-TIGHT MECHANISM** affords quick, easy adjustment without shutdown.
- 7. JAW PLATES** of manganese steel—reversible and shaped for maximum capacity and wear.



**BUY BOTH!**

Higher Output,  
Lower Upkeep!

# Pioneer

*Continuflow*

**EQUIPMENT**

**PIONEER ENGINEERING WORKS**  
1515 Central Ave. • Minneapolis 13, Minn.

Please send me more information on the following:

- |  |  |   |
|--|--|---|
| <input type="checkbox"/> JAW CRUSHERS  | <input type="checkbox"/> VIBRATING SCREENS | <input type="checkbox"/> TRAVELING          |
| <input type="checkbox"/> ROLL CRUSHERS | <input type="checkbox"/> WASHING PLANTS    | <input type="checkbox"/> GRIZZLY FEEDERS    |
| <input type="checkbox"/> CONVEYORS     | <input type="checkbox"/> APRON FEEDERS     | <input type="checkbox"/> MECHANICAL FEEDERS |
| <input type="checkbox"/> ROCK PLANTS   | <input type="checkbox"/> GRAVEL PLANTS     | <input type="checkbox"/> HEAVY DUTY FEEDERS |

Name \_\_\_\_\_

Company \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_

Zone \_\_\_\_\_

State \_\_\_\_\_

## Slurries...handled at Lower Cost

Continuous operation without attention. Individual engineering on every application. Heavy pumping parts of rubber, alloy iron, alloy steel - engineered to your specific requirements... Buy WILFLEY for economy and efficiency.



**WILFLEY**

**centrifugal PUMPS**

A. R. WILFLEY & SONS, Inc.  
Denver, Colo., U.S.A., New York Office  
1773 Broadway, New York City

## HAYWARD WON'T QUIT OR CAUSE TIME OUT BUCKETS

A Hayward Bucket keeps the job going ahead on scheduled time. It won't quit or cause time out.

THE HAYWARD COMPANY  
202-204 Fulton Street  
New York, N. Y.

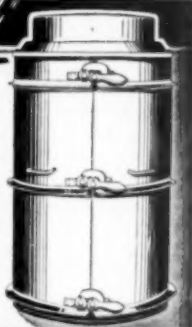
## THE Quinn Standard FOR CONCRETE PIPE

The Quinn Standard is known as the best the world over, wherever concrete pipe is produced and used. Backed by over 35 years service in the hands of hundreds of Quinn-educated contractors, municipal departments and pipe manufacturers who know from experience that Quinn pipe forms and Quinn mixing formulas combine to produce the finest concrete pipe of lowest cost.

### QUINN HEAVY DUTY PIPE FORMS

For making pipe by hand methods by either the wet or sanddry process. Built to give more years of service—sizes for pipe from 10" up to 120" and larger—tongue and groove or bell end pipe at lowest cost.

WRITE TODAY. Complete information, prices, and sales territories sent on request.  
Also manufacturers QUINN CONCRETE PIPE MACHINES.



QUINN WIRE & IRON WORKS 1603 12<sup>th</sup> ST. BOONE, IA.

## U. S. SYNCROGEAR

the motor  
with  
multiplied  
power

Geared to the needs  
of Rock Product plants



Ask for Bulletin

U.S. ELECTRICAL MOTORS Inc.

Pacific Plant  
Los Angeles 34, Calif.

Atlantic Plant  
Milford, Conn.

## CONCRETE BURIAL VAULTS

AMERICA'S FINEST MOLDS AND LOWERING DEVICES



BERG VAULT CO.

EQUIPMENT DIVISION  
1620 LUKAS HUNT RD. ST. LOUIS 20, MO.

## PERFORATED METAL SAND AND GRAVEL SCREENS

Manufactured exactly to your specifications  
Any size or style screen, in thickness of steel  
wanted with any size perforation desired.

We can promptly duplicate your present screens at lowest prices

CHICAGO PERFORATING CO.

2437 West 24th Place  
CHICAGO 8, ILLINOIS  
Virginia 7-6757

## Core Drilling by Contract

Exploration for coal and other mineral deposits.  
Foundation test boring and grout hole drilling  
for bridges, dams and all heavy structures.

Core Drill Contractors for more than 60 years

**JOY** MANUFACTURING CO.  
Contract Core Drill Division  
MICHIGAN CITY, INDIANA

Join

11,895 Producers

Who Regularly Read

ROCK PRODUCTS



# CLASSIFIED ADVERTISEMENTS

Single insertion rate \$8 a column inch. Larger insertions at lower rates; request classified rate card. POSITIONS WANTED and POSITIONS VACANT (not displayed ads) \$1 a column inch an insertion. Terms: Cash with order except for contract advertisers who are billed monthly.

Business Opportunities	151, 166
Cement Colors	151
Cindars	151
Consulting Engineers	166
Core Drilling	166
Equipment Wanted	151, 166
For Sale	150, 151, 161-166
Positions Vacant	166
Positions Wanted	151, 166
Services Offered	166

## FOR SALE

### Equipment Values!

**Tractor-Dozer**—"Caterpillar" Diesel D4, No. 573694, with LeTourneau cable dozer and Hyster D4N towing winch. Machine has been checked over, cleaned, painted. FOB Louisville. \$2750.00

**Compressor**—Sullivan, 365 cu. ft., No. 23553, mounted on 4 steel wheels, powered by a "Caterpillar" D13000 engine. Compressor and engine completely rebuilt in our shop. A real buy in a big compressor. FOB Louisville. \$4500.00

**Engine-Power Unit**—"Caterpillar" Diesel D-13000, serial No. 482759. A completely rebuilt engine at a bargain price. FOB Louisville. \$4475.00

**Truck and Trailer**—1945 G.M.C., series 500, cab-over-engine tractor with saddle tanks, fifth wheel, Tulsa winch and Kingham 10-ton trailer. Good condition. Ideal unit for a "Caterpillar" Diesel D6 tractor and dozer. Complete, FOB Louisville. \$2750.00

**Tractor-Dozer**—International Diesel TD14, No. T1P2487 TTA. A wide gauge tractor equipped with Bucyrus Erie hydraulic angle-doser. In fine condition. FOB Louisville. \$3650.00

**Tractor**—"Caterpillar" Diesel D4, ser. No. 71355, with LaPlant-Choate Hydraulic angle-doser. Ready for work. FOB Louisville. \$2975.00

ROY C. WHAYNE  
SUPPLY CO.  
800 W. MAIN ST. • LOUISVILLE, KY.  
Evansville, Ind. Paducah, Ky.

- 1—15 Ton Keystone Truck Crane Model 18A, New 1945.
- 1—3/4 Yd. Northwest S&D GM Diesel
- 1—80D Northwest S&D Murphy Diesel
- 1—D7 Bulldozer 4T
- 1—30 Ton Plymouth Std. Ga. Gas Loco. 1943
- 1—70 Ton Plymouth Std. Ga. Diesel Elec. Loco.
- 1—30 Ton Browning Steam Loco. Crane 1944
- 1—30 Ton Orton Diesel Loco. Crane 1941

B. M. WEISS COMPANY  
Girard Trust Co. Bldg.  
Philadelphia 2, Pa., Rittenhouse 6-2311

### FOR SALE

Universal 1/2 yard Truck Crane on Mack AC Chassis. In good operating condition suitable for use inside plant or yard.

G. & W. H. CORSON, INC.  
Plymouth Meeting, Pa.

Truck Crane: Bay City 20 ton, 80 ft. boom, on Cranesmobile 10 wheel truck.

Lima Shovel Boom 2 yd. Tipper and stick for model 802. Condition like new.

Gyratory Crushers—Special: Allis Chalmers Superior McCully 30", manganese fitted. Traylor 16".

Gyratory Crushers: All sizes 8"x30" to 42"x134".

Jaw Crushers: Farrel 15-B, size 24x36", manganese fitted, with or without motor and drive. Pioneer 24x36, portable, with or without diesel power. Also, all sizes 4x6 to 48x60".

Reduction Crushers: Symons 2 ft., 3 ft., 4 ft. and 5 1/2 ft. Telamith 24" Gyrosphere. Good Roads 1040. Allis Chalmers R322.

Drag Scraper Outfit: Sauerman 3 yd. Crescent bucket, 150 H.P., two drum hoist.

Drills: Bucyrus Erie 29T electric or gas with 9" bits.

Locomotive: Plymouth 25 ton, standard gauge with caterpillar diesel motor.

Screen: 5 ft. x 14 ft., double deck, 15 H.P. motor.

Shovel: Bucyrus Erie model 170-B, 6 yd. capacity, 2200 volt, A.C., built 1947.

Trucks: 30—Euclid bottom dump, also, end dump, with rock bodies. Combines 150 H.P. and 275 H.P. diesel motors, with booster steering.

Goodrich Super Long Life Cord Conveyor Belt (New). Large quantity of Goodrich Belt 42" wide, 9 ply, 42 oz. duck, 7/32" top cover, 1/16" bottom cover, on original reels, all NEW, NATURAL RUBBER, with or without mechanical parts.

### A. J. O'NEILL

Lansdowne, Pa.

Phila. Ph. Madison 3-8300-3-8301

### FOR SALE

225 HP Busch Sulzer 150 KW diesel engine generator set

2 1/2 yard Bucyrus Erie 54-B diesel crane-dragline new 1948.

30 ton Davenport diesel switching locomotive new 1942.

30 ton Orton locomotive crane diesel powered built 1942.

20 Koppel 20 yard all steel air dump cars. Std. ga.

MISSISSIPPI VALLEY EQUIPMENT CO.  
313 Locust St. St. Louis 1, Mo.

### OWNER SALE EQUIPMENT

Tank	(Rubber Lined)	10'6" dia. x 18'9 1/2"
Re-cupers	(Celtan Lang)	10' dia. x 14'11"
Rucker Wheel Feeders		36" and 34"
Mixing Tanks	(U Shaped)	10'6" x 30'
		10'6" x 12'
Turbulent Fan	(Starvent No. 135)	75,000 C.F.M.

Partial listing available

Phone 5-7741

MILL & QUARRY EQUIPMENT COMPANY

Baton Rouge, Louisiana

Many other items.

P.O. Box 1406

Two Deck 3'x5' Schenck vibrating screen  
Simplicity 8'x5' vibrating scalping screen  
Hommel single deck 3'x5' incl. vibrating screen  
Single and double deck Universal vibrating screens  
Tyler 400 vibrator 1'x5' single deck vibr. screen  
Niagara double deck 18"x30" vibrating screen  
American pulverizer, type RT-T, anti friction  
8-A 18" Knitted crushers, anti friction  
Farrel-Blake jaw crusher, 18"x16" A  
Baraban 18"x16" type B jaw crusher  
Champion No. 4, 9"x15" jaw crusher  
Belknap 12"x24" jaw crusher  
Jeffrey single roll 18"x18" coal crusher  
Heavy duty double roll 28"x18" crusher  
Grandier Aristocrat Poulton 18-90 grinder  
Laboratory Grinders

Complete bucket elevators, open and enclosed  
Inclined or vertical elevators, 6"x10" buckets  
Standard chain for elevators and drives  
Elevator belt, pulleys, sprockets, buckets, enclosures  
Thimble roller chain, 3", 4", 5", 6", 8", 10"  
Standard wood screw conveyor, new, 48"x100"  
Slat conveyor 30" wide 50' long  
Portable conveyors, 18"x10", 18"x20", 14"x17", 16"x20"

Apron Feeders 18" 24" and 30" wide  
Kongs strand 15" and conveyor 15"  
New 36" belt conveyor with Tinken beatings  
New 30" belt conveyor with Tinken beatings  
New 24" and 18" belt conveyor  
Benedictson 18" belt conveyor plain bearings  
Screw and gravity conveyors

Four Jeffrey No. 4 vibrating feeders  
V pulleys, gears, sprockets and drive pulleys  
Feeders for conveyors and elevators  
Pumps—positive, electric, steam  
Ten ton, 30" open electric crane  
1-B overhead new air hoist, 10000 lb. capacity  
Seven magnetic belt pullers  
Y&T 4 ton new Krom crane with steel  
160 gear reducers from 1/2 to 75 HP  
Gearmotors and variable speed motor units  
Electric and air hoists, Barco drives  
Bin gates: 12x12", 18x18", 20x20" opening

### G. A. UNVERZAGT & SONS

136 Celt St. Irvington 11, N. J.



PIPE—Small and Large Diameter, from our Stock

Welded  
Seamless  
Corrugated

Supplies of Fittings  
Valves and Tube Turns  
Power Piping Fabrication  
SPEED-LAY Pipe System  
Quick Assembly  
Economical, Light Weight.

## ALBERT

PIPE SUPPLY CO., INC.

Berry at North 13th Sts., Brooklyn 11, N. Y.  
Phone: EVERgreen 7-8100.

# FOR SALE

## TRAMWAY & MINE MILL EQUIPMENT

**INTERSTATE AERIAL TRAMWAY**—Approx. 5200' long, continuous carrier type, 7 intermediate towers, 100 tons per hour via 42 steel 1 ton cars. Automatic control systems for feeding and discharge. Price \$35,000.

**INTERSTATE SINGLE CARRIER TRAMWAY**—Approx. 690' span, 125 tons per hour via single 80 cu. ft. cap. car. Provides automatic dump disposal from continuous carrier listed above. Price \$8,000.

**SYMONS CRUSHER**—5½ ft. Short Head Cone Crusher. Price \$20,000.

**HARDINGE DRYER**—Ruggles-Cole Class XF-12 Rotary Dryer arranged for parallel flow of materials and gases. Shell 80" dia. 60' long of ½" plate, 5/16" liners—complete with exhaust fan and driver.

**Also—TRAYLOR ROTARY DRYER—FARRELL 13"x36" JAW CRUSHER—TRAYLOR 28"x36" JAW CRUSHER.**

Above Equipment In Good Operating Condition, Priced As Is At Our Asbestos Mines In Vermont.

Inspection invited — Inquire

**THE RUBEROID CO.**

500 Fifth Ave.

New York 18, N. Y.

### FOR SALE

- 1—B & W coal pulverizer
- 1—American pulverizer with 125 HP motor
- 1—Jeffrey hammer mill 24"x36"
- 1—Hammer mill 42"x36"
- 1—70 HP Marine type diesel engine
- 1—Vacuum pump
- 1—Deck boat
- 1—Tug boat
- Electric motors AC
- Generator sets 30 KW and 50 KW
- Air compressors
- Wilson welding machine
- Link Belt pan conveyors 36"x22" centers
- Richardson automatic scales
- Fuller Kinyon pump 6"
- Wood and steel bins, hoppers and tanks
- 1—Fuller Kinyon rotary compressor
- 1—10"x150" klin with new liners
- Fuller clinker cooling equipment for 16" klin
- Schmidt tube mill 6'6"x20"
- ¾" handling tape
- 4" and 5" 2 and 3 way cement control gate valves
- 3—Small gasoline driven generators
- 5½"x22" tube mills

**OLLIE E. LAWRENCE**  
P.O. BOX 688  
QUINCY, MICHIGAN

### OUTSTANDING SHOVEL AND CRANE BARGAIN

Marion Model 471 Gas Electric Shovel 1½ cu. yd. rated capacity equipped with 2 cu. yd. shovel dipper, Waukesha 6 cylinder gasoline engine operating G.E. generator and motors. New 50' crane boom included. Where electric current is available in pit, quarry or dock, gas engine could be eliminated for low cost operation. A real buy at \$5,000

**H. O. PENN MACHINERY CO., INC.**  
140th St. and E. River N. Y. 54, N. Y.  
CYpress 2-4800

### LOCOMOTIVES — CRANES QUARRY TRUCKS

- 1—15 ton Plymouth Diesel locomotive, 36" gauge, built 1947, used less than one year.
- 1—7 ton Plymouth standard gauge gasoline locomotive, built 1941, Buda engine.
- 6—Euclid trucks, 15 ton rear dump with 12 yd. bodies. Cummins diesels.

**Birmingham Rail & Locomotive Company**  
Birmingham 1, Ala.

### CRUSHERS, ETC.

- 1—Kent Maxcon-Type No. 7 Ring Roll Mill and Drive.
- 1—Sturtevant No. 2 Ring Roll Mill and Drives.
- 1—Pair Rolls, Allis-Chalmers 40"x15", Anaconda, rebuilt and Re-habbed.
- 1—No. 6 Traylor Gyratory Crusher with T.Z. head.
- 1—No. 4½ Traylor Gyr. Crusher.
- 1—No. 5 Champion Jaw Crusher 11"x26".
- 1—4"x5" Tyler Hammer D. Deck Vibrating screen.
- 1—18" Link-Belt Apron Conveyor—9" pitch, 27' centers.

**JOHNSON & HOEHLER, INC.**  
P.O. Box 102 Lensdowne, Pa.

### QUARRY EQUIPMENT

- 1836 Farrell deep jaw crusher
- 1026 Cedarapids jaw crusher. New condition.
- 1947 Allis-Chalmers Blake type jaw crusher.
- No. 1 Cedarapids Kubit impact breaker
- Allis-Chalmers 5'x14" double disk screen.
- Niagara 4'x8" screen.
- 60-ton 2-compartment storage bins with cinch-disk gates.

### SHOVELS AND CRANES

- Lorain 77 diesel powered 1½ yd. shovel-crane.
- Marion 1 yd. diesel heavy duty truck crane on heavily reinforced Mack.
- PAH Model 190 shovel & yd.
- PAH Model 600 crane-drag.

### BELT CONVEYORS

- 18"—24"—30"—36"
- Lattice or channel. "Sealed-for-life" idlers.

### GENERATORS AND LIGHT PLANTS

- ¼ KW to 125 KW, alternating and direct current, gasoline and diesel powered.

### AIR COMPRESSORS

- Worthington 2-stage, water-cooled, vertical 250 cu. ft. CFM, new condition.
- Waukesha gas.
- Gardner Denver 105 cu. ft. Ford with air receiver, hose reel, power takeoff.
- Gardner Denver 105 cu. ft. Ford with Wood 2 yd. dump body, air receiver, V-belt driven from power takeoff.
- LeBlond 2-stage 185, air-cooled, skid mounted, built in two boxes, hose reels and hose.
- Gardner Denver 2-stage 160, skid mounted.
- Schramm 210 with International T-101 diesel.
- Worthington 210, 2-stage, air-cooled, on steel wheels with Herring drive.
- Chicago Pneumatic 210, 2-stage, air-cooled Caterpillar diesel on rubber tired wheels.
- Gardner Denver 215, 2-stage, skid mounted, Murphy 4-cylinder diesel.
- Pennsylvania 12"x18" class 24, single cyl. 205 cu. ft. belt driven, 50 HP air inlet, 80 PSI.
- New Gardner Denver 500, 2-stage, water-cooled.
- 10000 Caterpillar diesel on 4 pneumatics. Used 2 months.

### L. B. SMITH, INC.

Camp Hill, Pa.  
Phone Harrisburg 7-3431

### SURPLUS BARGAIN EQUIPMENT

- 1—AIR COMPRESSOR—Latest Model Gardner Denver 230—Powered with Caterpillar D-8800—Both Engine and Compressor Completely Overhauled at Factory—Mounted on 4" MC 6-Wheel Drive Truck—Truck has Front Mounted 5-ton Winch—Bargain At \$3,850.
- 1—MATERIAL ELEVATOR—Heavy Duty Robbins—Heavy Duty—55° C to 4°—14" Steel Buckets—8" Channel Frame—Excellent Condition—Used Less Than 60 Days—\$1,675.00.

All above prices quoted F.O.B. yards or trucks Quincy, Ill., and offered subject to Prior Sale. Equipment may be inspected any time Monday thru Friday at Quincy, Ill.

**BLACK WHITE LIMESTONE CO.**  
Front and 8th Sts., Quincy, Ill., Ph. 8615

1000 B. Madison Hill Mid. ARKALPH. PLANT B-41  
818 Washington and Second St. Gravel Plants  
Bettendorf Bulk Cement Plant  
CRUSHERS: 1936 Type 8 1240 Grindmill, 1942  
Badger, 2250 Champion RR, 21430 Armo, 1942  
Buchanan, 4200 Farrell JAW, 1' 4" Traylor TX  
14" and 36" McCully 610R, 7' and 2½' screen  
CONC.  
Sinks and 2500 Dials, 1 NB Grindmill, Williams  
4, 3 and 20 Hammer Mills  
30"x27½" Bell and 26"x22" Apron Crushers  
14 ton G.E. Diesel Eng. 44 hp. Locomotive  
2-30 ton Vulcan 80 hp. Diesel Locomotive  
Barney Green 42A and Bains 7W Locom.  
100' Dodge AMSC Pump, Satchell Ladders  
4200, 5400, 5940 and 6420 Rotary Drives  
N. Y. Loring Gas Engine, Diesel and Bar  
4 1/2 PAH 1000L, 4 1/2 cu. Yds. Diesel DRUM  
SHOVELS: 1/2 cu. Yd. Bar 319 Gas, 1/2 cu. Yd. Loma 34  
Gas and 41 Diesel, 1½ cu. Yd. Loma and Borman  
82 Diesel, 1½ cu. Yd. NWB Reeling 601, PAH  
823A, Loma 402, all diesel  
Buses: NEW Ford V8s, Screens: Also used.

**MID-CONTINENT EQUIPMENT CO., INC.**  
6677 Washington Pa. 2290 St. Louis 5, Mo.

### NORTHWEST 78-D

2 cu. yd. diesel crawler shovel re-built and guaranteed.

### FOR SALE

**HODGE & HAMMOND, INC.**  
1162 Grinnell Place N. Y. 59, N. Y.

# Used Truck Mixers For Sale

All late models mounted on trucks and unmounted,  
from 3 yards to 5½ yards

Both HORIZONTAL and HI-DISCHARGE

All makes and sizes

50 used late model Jaeger Building Mixers, sizes 6EL, 11EL, 16EL, mounted  
2 pneumatic tires. Reconditioned. Immediate delivery.  
Prices attractive.

## JAEGER-LEMBO MACHINE CORPORATION

127th St. and Northern Blvd.

Corona, L. I., New York

WIRE

PHONE Newtown 9-7777

WRITE

### SPRING CLEARANCE

- 1—Ransome 4½ yd. Horizontal Transit Mixer, mounted Sterling Diesel Truck.
- 1—Smith 2 yd. Used HI-Discharge Mixer mounted on Diamond T COE Truck.
- 1—Hex "16.8" Slightly used mixer.
- 1—Gilson "22" New Pulverizer, Big discount.
- 1—Gilson "14" Used Pulverizer, Cheap.
- 1—Universal No. 3 Rebuilt Pulverizer.
- 1—Inley "K-12" Used ½ yd. Dragline.
- 1—Lorain "30" Used ½ yd. Dragline.
- 1—LeTourneau "J-12" Used 12 yd. Scraper.
- 1—PAH "200" ¾ yd. used shovel.
- 1—Scraper "315" used compressor, cheap.

EIGHMY EQUIPMENT COMPANY  
Rockford, Ill.

### FOR SALE

One 50 B Bucyrus Erie Electric Shovel, mounted on caterpillars, 35 ft. Boom, 19 ft. Dipper Handle, 2 yard Dipper, Immediate Delivery.

Duquesne Slag Products Co.  
809 Bingham St. Pittsburgh 3, Pa.

9 JAW CRUSHERS—1400, 2400, 2600 and 2750.  
30. FAHREL—TRAYLOR—CEDAR RAPIDS  
1000 FT. C.P. ELECTRIC AIR COMPRESSOR  
10 FT. GAYTO MECHANICAL REPARATOR  
80% NEW CONDITION  
11 AND 25 TON VULCAN GAS LOCOMOTIVE  
25 TON AMER. GAS LOCO. CRANE  
30 TON PLYMOUTH DIESEL LOCOMOTIVE  
5½ FT. SYMONS SHORT HEAD CONE  
4—J. R. QUARRY MASTER DRILLS  
2—40" HARDINGE BALL MILLS  
1000 FT. 10" 40" CONVEYOR BELTS  
"80" 40" and 10" 40" ROTARY DRILLERS  
15 TON AMER. 35 FT. BOOM, STEEL LEO. TIE-  
BACK AND 175 HP. ELEC. HOIST  
10 VIBRATING SCREENS, 240, 300, 400, 500  
and 750  
371. BUCYRUS WELD DRILL  
DARIEN, 60 E. 42nd St., N. Y. 17, N. Y.

### FOR SALE

One 150 Ton, 50 foot live rail, Fairbanks, Type M Railroad Track Scale.

THE CARBON LIMESTONE CO.  
Lowellville, Ohio

### RAILS—NEW AND RELAYING CARS—NEW AND USED—ALL TYPES

M. K. FRANK  
480 Lexington Ave. Park Building  
New York City Pittsburgh, Penna.  
105 Lake St., Reno, Nevada

### CRUSHERS

#### Priced to Sell

REDUCTION CRUSHER—Tolomith Model 32B. Cap. 20-24 tons ¾". Max. size feed 5". Rebuilt, FOB S. F. \$1500  
IMPACT CRUSHER—Cedar Rapids Kubitz size 3. Max. size feed 3", 4 and 6 hammer rotor. Cap. 30-50 tons/hr. Rebuilt, FOB S. F. \$2000

Ask for our complete equipment list.

COAST EQUIPMENT CO.  
940 Bryant St. San Francisco, Calif.

### FOR SALE

Autocar 5 yard mixer truck.  
International K11 tractors and dump trucks suitable for mixer trucks priced \$1500 to \$3500.  
International KB810 tractors.  
25-ton Fruehauf low boy.  
Platform trailers and tank trailers.  
Contact

BERMAN SALES COMPANY  
R.D. 1 Pennsbuurg, Penna.  
Phone Pennsbuurg 521

FOR SALE IN CORPUS CHRISTI, TEXAS Located alongside both railroad and ship channel  
P&H Model 1055 LC  
Crane Crawler Mounted  
100 ft. boom and 25 g.b.  
250 HP Ruda Diesel A-1 condition  
HALLIBURTON PORTLAND CEMENT CO.  
P.O. Box 1200, Corpus Christi, Texas

### DEPENDABLE USED MACHINES

Special—New Morris 12" gravel pump, less than ½ price

H-B 6" sand pump  
Pioneer 400 crane  
Wackels-MGR engine  
Butler Crane  
Dor No. 5 hammermill  
Hughes Keenan Roustabout  
crane

Pioneer duplex portable plant  
Barker Grout 2400 psi.  
concrete  
cat. H-B with h.d. bulldozer  
30 ft. switches for 20" 22"  
track

Browning 25 ton crane  
Universal truck crane  
Boys ¾ yd. dragline  
Case buckets, all sizes  
Used conveyor belt

10030 S. Ridgeland Ave.

All above equipment reconditioned in our own plant.  
TRACTOR & EQUIPMENT CO.

Oak Lawn, Ill.

## FOR SALE

**AIR COMPRESSOR**—1 R Centrifugal, 4-stage, single flow, 6500 CFM, 102" M.D. (Unused)

**BLOWERS**—74000 CFM, 10" SP, Start, Turbo No. 2  
19000 CFM, 7 1/2" SP, Type SE, No. 12  
15000 CFM, 1 1/2" SP, N. Y. Blower, Type ME, Size 27 (Unused)  
12500 CFM, 1 1/2" SP, N. Y. Blower, Type ME, Size 27  
(Other Blowers from 1,000-50,000 CFM)

**CARPULERS**—Link Belt, 5000Z, 3 HP motor.

**CONVEYORS**—L. B., flat, 24" wide, 30" cc. Rapid reversible power booster, Model RPKC-1516, 16 x 15.

**CRUSHERS**  
Williams Hammermill No. 3  
Jeffrey Swing Hammermill 36" x 24", A2.

**DRYERS, KILNS, COOLERS**—4 x 30 x 10 Traylor 7 x 4 1/2" Link Belt  
3 1/2" x 16" Link Belt, Roto Louvre  
3 x 60" x 6" x 40" x 7 x 60" x 7 x 70"

**DUST COLLECTOR**—Dracon Automatic Filter Unit, 3300 to 3900 CFM, complete. Contact parts sta. steel.

**ELEVATORS**—BUCKET—Webster, 48", MI Buck ets, 14 x 7  
Jeffrey, 68", MI Buckets, 10 x 6.

The above is only a partial listing of our inventory. Send us your inquiries.

**Heat and Power Co., Inc.**  
70 PINE STREET, NEW YORK 6, N. Y.  
DIOBY 8-0373

TOP PRICES  
PAID FOR  
SURPLUS  
EQUIPMENT

**FEEDERS—VIBRATING**—Syntron Type F33  
Jeffrey 18" x 36"  
Allis-Chalmers, 36" x 12" x 6."

**PUMPS**—Vacuum, Stokes, Mod. 212C, 100 CFM.  
Frederick Iron & Steel 8" DSV-SM, 2300 GPM, 150' head, 125 HP TEFC motor and control panel.

**REDUCERS**—Link Belt PIV Drives—  
Size V-1, ratio 2 to 1  
Size H-3, ratio 4 to 1  
Size M-4, ratio 2 to 1.

**Reeves Variable Drives**  
Size No. 0, No. 000, No. 2, ratio 2-1.  
Cleveland, Size 400 AH, ratio 3-3.9 to 1 and 4-5.6 to 1.  
Cleveland, Size 200 AH, ratio 5/4 to 1.  
Size 100 AH, ratio 5/4 to 1 and 50 to 1.  
Size 20 AT, ratio 60 to 1.  
Link Belt, Size HWB-50, ratio 34.8-1 and 52 to 1.  
Size HWB-60, ratio 42.5 to 1 and 110 to 1.  
Size HWB-35, ratio 220 to 1.  
(Other Reducers ratio 4-1 to 263-1, 1 to 50 HP.)

**TANKS**—75000 gal. rubber lined, 13 x 25 x 8 1/2", (Unused)  
(Other tanks from 350-41,000 gals.)

### "UNUSUAL OPPORTUNITY"

AT LESS THAN  
25%  
OF ORIGINAL COST

#### RUBBER CONVEYOR BELTING

(Mfd. by Goodyear Tire & Rubber Co.)

48" and 60" wide

Slightly Used — Excellent Condition

Extremely Low Priced

Can Barely be distinguished from Brand New.

1,660 Ft.—48" x 7 Ply, 48 Ounce Duck, 1 1/2"

Rubber Top Cover x 1/16" Bottom Cover.

1,700 Ft.—60" x 9 Ply, 48 Ounce Duck, 1 1/2"

Rubber Top Cover x 1/16" Bottom Cover.

Will sell all or part.

Samples upon request. Inspection if desired in New York City

#### Also Available

#### BRAND NEW RUBBER CONVEYOR BELTING

GUARANTEED FIRST GRADE  
LOW PRICED

2,600 Ft.—34" x 6 Ply, 32 Oz. Duck,

3/16" top x 1/16" bot. covers.

1,000 Ft.—30" x 5 Ply, 32 Oz. Duck,

1/8" top x 1/16" bottom covers.

2,000 Ft.—24" x 5 Ply, 28 Oz. Duck,

1/8" top x 1/32" bottom covers.

2,500 Ft.—18" x 4 Ply, 28 Oz. Duck,

1/8" top x 1/32" bottom covers.

If interested in other sizes, please advise.

PHONE WIRE WRITE

CARLYLE RUBBER CO., INC.

62-66 Park Place, New York 7, N. Y.

PHONE: Digby 9-3810

#### FOR SALE

Six (6) 8'3" x 45'11" Efficient

Multi-tube Indirect Rotary

Coolers by Traylor for Lime

and Alumina Oxide.

THOMAS M. BROWN

1315 Oliver Bldg.—Pittsburgh, Pa.

#### FOR SALE

1—Model No. 41L-T224 Austin 1/2 yard

Drumline Powered Buffalo Type 13J

—No. 404 Gasoline Engine.

1—New Buda Gasoline Engine, Model

HP290, Serial No. 284270—A standby

never used.

Box 1-55, ROCK PRODUCTS, 309 W.

Jackson Blvd., Chicago 6, Illinois

#### FOR SALE

1—30" Stedman disintegrator with new

surge new—2 sets of rebuilt hard-

ened breaker plates—1 new set bear-

ings—Excellent buy—\$1000.00

With 25 h.p. 220V 3P electric motor

\$1150.00

AIRPORT SAND & GRAVEL CO.

505 Bennett St. Luzerne, Pa.

**Need RAILS?**  
You'll get them  
"Faster From Foster"  
Largest stocks in U.S.  
NEW & RELAYING RAILS  
Track Tools and Accessories  
Foster guarantees material satisfactory or  
returnable freight both ways, our expense.

PIPE • PILING • WIRE ROPE & KILNS  
**LB FOSTER CO.**  
Pittsburgh 30, Pa. New York 7, N. Y.  
Chicago 4, Ill. Houston 2, Tex.

#### FOR SALE

#### Crushers—Screens—Conveyors

6—Link Belt Conveyors 18" belt—anti-

friction bearings—2 HP enclosed

General Electric geared head mo-

tors—roller chain drive from 12" up

to 22" centers. Two with Stearns Mag-

netic Pulley.

2—Link Belt 3' x 8"—2 Duck Vibrating

Screens with V Belt Drive and 2 HP

General Electric enclosed motors.

Also 2—4' x 8' screens.

2—Model 5'S New Holland Roll Crushers

(late models)—smooth shells 24x16

with 25 HP enclosed General Electric

motors—3 Phase 60 cycle—220-440

Volt

1—Model 65'S New Holland Roll Crush-

er (late model)—1 corrugated—1

smooth shell with V Belt drive and

40 HP General Electric enclosed mo-

tor 3 phase 60 cycle—440 Volt.

Above equipment in use about 6 months,

offered subject to prior sale. Phone or

write.

E. M. KLIEBENSTEIN CO.

1099 Hendricks Causeway

Ridgefield, New Jersey

N. J. Phone: MOrreana 6-5523

N. Y. Phone: LOngacre 3-1791

#### RUBBER CONVEYOR BELTING

At Lower Prices

Top Quality—Immediate Delivery

12" widths to 36" (All plies)

TRANSMISSION BELTING

AIR HOSE (All sizes)

SUCTION and DISCHARGE HOSE

WATER HOSE

V BELTS

Also Mill Remnants

Write or wire collect for prices and samples

E. D. HEEMS & SON

1286 Hollywood Ave., Memphis, Tenn.

#### CONSULT US BEFORE BUYING OR SELLING USED

FARREL-BACON CRUSHERS SIZES 60" x 48" to 10" x 7"

As manufacturers of these machines we are in a position to assure you as to condition and operating ability. Send for catalog.

149 Broadway BACON-PIETSCH CO., INC. New York 6, N. Y.





## Bargain — New Double-Deck Hendrick Shaker Screen

New, never used, double-deck Hendrick shaker screen, 5 x 16 ft. Top Deck 2 3/8" x 2 5/8" x 2 1/8" slots, equivalent to 3" round. Bottom Deck 3 1/2" x 1 1/2" x 1 1/2" slots, equivalent to 3/4" round. All of abrasion resistant steel. No motor or transmission. Shipping weight 13,000 lbs. capacity 100 - 150 net ton per hour. Price \$5,200. Can be inspected in Chicago.

Contact W. U. Prentice

**GREAT LAKES CARBON CORP.**

333 North Michigan Ave., Ph. Franklin 2-5445, Chicago 1, Ill.

1—G. & H. 5000 gpm 1 yr. old pump, 18" discharge, 14' lift powered by GM 571 full diesel power unit \$250.00  
1—Caterpillar Model 22 Tractor \$600.00  
1—Kohler 504 181" diesel engine, 55 ft. boom, clam and drag, long and wide tracks, 3 yrs. old \$10,000.00  
1—Hendrick 1 cu. yd. drag bucket \$750.00  
1—Caterpillar 0.6 Angledrive w/Hyster Towing winch, 1 yr. old \$9000.00  
LATHAM CONSTRUCTION CO., 1446 N. Grand Ave. Columbus, Ohio, PH—Kingswood 7829

## FOR SALE

One Lorain 41 Shovel with Caterpillar Diesel Engine heavy duty manganese dipper good condition ready to work 3/4 yard capacity reasonable. Machine No. 14,597

**FRED HORNSEY & COMPANY**  
Potosi, Missouri

## FOR SALE

Cedar Rapids Hammermill 2033, Serial Number 11603. Used only 14 hours. With Allis-Chalmers E90 Power Unit. Grooved Pulleys with Vee Belt drives. Will sell complete unit or separately. Bargain.

**KERN-LIMERICK, INC.**  
Little Rock, Arkansas

## FOR SALE

Cedarapids Portable Secondary Screening and Crushing Plant with 16 by 24 roll crusher.

**Duncan Bros., Annapolis, Missouri**

## FOR SALE

One Model 40' Dumperette and two Model 20' Dumperettes with power takeoff. Used very little.

**J. C. BUDDING COMPANY**  
P.O. Box 68 Lancaster, Penna.

## POSITIONS VACANT

### WANTED

#### CEMENT PLANT MAINTENANCE AND REPAIR FOREMAN

Cement Plant located in Eastern U. S. Please give past experience and details. All replies to be held in confidence. Reply to Box I-60, Rock Products, 309 W. Jackson Blvd., Chicago 6, Ill.

#### SENIOR MECHANICAL ENGINEER

Progressive manufacturer of equipment for cement, lime and metallurgical plants requires a design and mechanical engineer. Previous experience necessary. State experience, salary desired and references to Box I-42, Rock Products, 309 W. Jackson Blvd., Chicago 6, Ill.

**TWO DRAFTSMEN WANTED**—Must be experienced on Cement or Lime Plants. Work involves layout, construction and detail drawings. Send all information, age, past experience, salary expected, etc. Location—Washington, D. C. Box I-49, Rock Products, 309 W. Jackson Blvd., Chicago 6, Ill.

**WANTED**—Man experienced in marketing Rock Wool Insulations, including Industrial. Knowledge of production also desirable. Position leading to management of Insulation Division. Box I-50, Rock Products, 309 W. Jackson Blvd., Chicago 6, Ill.

#### —BUSINESS OPPORTUNITIES—

##### BUSINESS OPPORTUNITY

Small mountain beautifully speckled and grey granite near Hendersonville, N. C. Center of new development, big demand for building stone and for aggregates for new two mile rural road program. Will sell on royalty basis or any reasonable arrangement. Write **A. M. Byers, 396 Wimbledon Rd. N.E., Atlanta, Ga.**

#### SERVICES OFFERED

##### Plant Layout

##### Design and Detail

Cement, Concrete, Stone, Slag, Ore Concentration  
Experienced—Reasonable

Box I-61, Rock Products, 309 W. Jackson Blvd., Chicago 6, Ill.

#### SALES ENGINEERS

Manufacturer of Heavy Machinery for Process Industries covering Rotary Kilns, Dryers, Ball Mills, Rolls and Crushing Machinery has openings for experienced men. Write, advising qualifications, experience and salary expected to Box I-41, Rock Products, 309 W. Jackson Blvd., Chicago 6, Ill.

#### CORE DRILLING



#### CORE DRILLING

—anywhere!  
"We look into the earth"  
**PENNSYLVANIA DRILLING COMPANY**  
Pittsburgh 20, Pa.

#### —CONSULTING ENGINEERS—

**Quarries  
Crushing Plants  
Cement Plants  
Storage Methods  
Operating Costs**

**E. LEE HEIDENREICH JR.**  
Consulting Engineers  
67 Second Street, Newburgh,  
N. Y.  
Phone 1828

**Operation  
Plant Layout  
Design  
Appraisals  
Construction**

#### CUT YOUR LIME PRODUCTION COSTS!

If you are operating rotary kilns, it's 10 to 1 you can reduce your lime production costs—as much as 40%. We determine the actual savings possible by proved, scientific methods. Details on procedure gladly furnished—no obligation. Delay costs you money. Write today.

**RALPH E. GIBBS — ENGINEERING**  
Consulting Engineering Service  
R.D. No. 4 York, Penna.

#### —POSITIONS WANTED—

Position Wanted: Graduate Engineer with 12 years experience in the Portland cement and non-metallic industries. As chemist Engineer and Supt. desire to make a change leading to future. Box I-53, Rock Products, 309 W. Jackson Blvd., Chicago 6, Ill.

##### POSITION WANTED

Supt. or Mgr. aggregate producing plant. Cost conscious, good labor relations. 20 yrs. experience. References. Location immaterial. Box I-56, Rock Products, 309 W. Jackson Blvd., Chicago 6, Ill.

# It's **EASY** to install "Payroll Savings"

... and 20,000 companies' experience proves it pays!

If you've put off installing the Payroll Savings Plan in your company because you feel it would be "a lot of work," then this advertisement is certainly for you! Because it's really very simple to give your employees the advantages of investing in U. S. Savings Bonds the easy, automatic "Payroll" way.

## HERE'S ALL YOU NEED TO DO

*Appoint one of your top executives as Savings Bond Officer. Tell him to get in touch with your State Director, Savings Bonds Division, U. S. Treasury Department. Here's what happens . . .*

The State Director will provide application cards for your employees to sign—plus as much promotional material and personal help as necessary to get the Plan rolling in your company.

Those employees who want Savings Bonds indicate on the applications: how much to save from their pay; what denomination of Bonds they want; and the inscription information to appear on the Bonds.

Your payroll department arranges to withhold the specified amounts, arranges to get the Bonds, and delivers them to the employees with their pay.

The Bonds may be obtained from almost any local bank or from the Federal Reserve Bank or may be issued by the company itself upon proper certification by the Federal Reserve Bank or Branch in the company's District.

## THAT'S ALL THERE IS TO IT!

In case you're skeptical as to how many of your employees would like to have Payroll Savings, canvass your plant—and be prepared for a surprise. (Remember that pay-check withholdings for Bonds are *not* a "deduction"—the employee takes home his Bonds with his pay.) One leading manufacturer, who had professed little faith in the Plan, found his eyes opened when he asked the people in his plant whether they would like to obtain Bonds in this way. Within only six months after he installed the

Plan, half his employees signed up. A prominent aircraft manufacturer, whose company had used the Plan for some time, was not aware of its potentialities until his personal sponsorship increased participation by 500% among his company's employees.

### THE BENEFITS ARE BIG— FOR EVERYONE

The individual employees gain security—they know that the Bonds they hold will return \$4 for every \$3 at maturity. The company gains from

the resultant increased stability and efficiency of its workers. The whole nation gains because Bond sales help stabilize our economy by spreading the national debt and by creating a huge backlog of purchasing power to boost business in the years ahead.

Is it *good policy* to deprive your company of Payroll Savings—even one more pay day? Better at least have a talk with your U. S. Savings Bonds State Director, get the answers to your questions, and *know for sure*.



The Treasury Department acknowledges with appreciation the publication of this message by



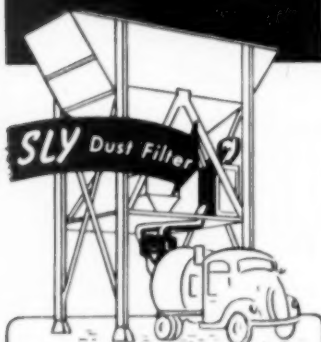
## ROCK PRODUCTS

This is an official U. S. Treasury advertisement prepared under the auspices of the Treasury Department and The Advertising Council.

ROCK PRODUCTS, May, 1950

167

## DUST-FREE TRUCK BATCHING



• A Sly Dust Filter will save you the dollars now lost in cement dust and greatly improve working conditions—assures clean truck mixers, clean yard and plant. Pleases the neighbors. Simple, inexpensive, easy to install, economical to operate—a paying investment. Send for Folder 84-H and quotation.

THE W. W. SLY MANUFACTURING CO.  
4746 TRAIN AVENUE • CLEVELAND 2, OHIO

## Tired of your Jaw Crusher Wedge Adjustment?

## ..The New Hydraulic Shim Jack

is the  
answer!

# GRUENDLER

**Crusher & Pulverizer Co.**  
**Dept. RP5 St. Louis, Mo.**

Our 65th Year

## INDEX TO DISPLAY ADVERTISERS

Allis-Chalmers .....	21, 24, 33, 157	Kensington Steel Co. ....	113
American Brake Shoe Co. ....	170	Kent Machine Co. ....	146
American Manganese Steel Div. ....	156	Kirk and Blum .....	142
Electro-Alloys Div. ....	170	Koehring Co. ....	124, 125
American Pulverizer Co. ....	117	Leschen, A., & Sons Rope Co. ....	114
Appley, J. W., & Son, Inc. ....	123	LeTourneau, R. G., Inc. ....	14, 15
Armstrong-Bray & Co. ....	118	Link Belt Co. ....	1, 118, 158
Automatic Spring Coiling Co. ....	148	Lith-I-Bar Co. ....	149
Barber-Greene Co. ....	17, 18, 19, 20	Macwhyte Co. ....	117
Beaumont Birch Co. ....	116	Master Builders Co. ....	153
Bemis Bro. Bag. Co. ....	6	Maxon Construction Co., Inc. ....	138
Berg Vault Co. ....	160	Dumpepe Div. ....	138
Besser Manufacturing Co. ....	141	Mine & Smelter Supply Co. ....	118
Blaw-Knox Co. ....	137	Mishco Corporation ....	123
Bucyrus-Erie .....	27	Morris Machine Works ....	107
Buell Engineering Co. ....	39	Multiplex Machinery Corp. ....	133
Butler Bin Co. ....	126		
Carpenter Manufacturing Co. ....	138	Nordberg Manufacturing Co. ....	34
Caterpillar Tractor Co. ....	10, 11	Pennsylvania Crusher Co. ....	
Chain Belt Co. ....	29	Outside Back Cover	
Chevrolet Motor Div. ....	13	Pioneer Engineering Works ....	159
Chicago Perforating Co. ....	160	Portland Cement Association ....	147
Clark Equipment Co. ....	144	Quinn Wire & Iron Works. ....	160
Clipper Manufacturing Co. ....	140		
Colorado Fuel & Iron Corp. ....	110	Raymond Pulverizer Div. ....	26
Columbia Machine Works. ....	149	Resisto-Loy Co. ....	169
Combustion Engineering—Super- heater, Inc. ....	26	Rock Bit Sales & Service Co. ....	116
Commercial Shearing & Stamping Co. ....	149	Ryerson, Jos. T., & Son, Inc. ....	115
Concrete Equipment Co. ....	147, 152		
Concrete Machinery Co. ....	142	Sauerman Bros., Inc. ....	114
Denver Equipment Co. ....	155	Schild Bantam Co. ....	105
Detroit Diesel Engine Div. ....	31	Screen Equipment Co., Inc. ....	106
Ehram, J. B., & Sons Mfg. Co. ....	158	Sheffield Steel Corp. ....	109
Euclid Road Machinery Co. ....	103	Simplicity Engineering Co. ....	
		Inside Back Cover	
Farquhar, A. B., Co. ....	143	Sintering Machinery Corp. ....	111
Farrel-Bacon .....	115	SKF Industries, Inc. ....	22
Fleming Manufacturing Co., Inc. ....	149	Sly W. W., Mfg. Co. ....	168
Flexible Steel Lacing Co. ....	158	Smith, F. L., & Co. ....	36
Ford Motor Co. ....	28, 35	Smith Engineering Works ....	50
Fuller Co. ....	16	Smith, T. L., Co. ....	122
		Standard Sand & Machine Co. Blystone Div. ....	148
Gatzke, Chas., Mfg. Co. ....	148	Stearns Manufacturing Co., Inc. ....	154
General Electric Co. ....	4, 5	Stoody Co. ....	43
General Engines Co., Inc. ....	148	Stroh Process Steel Co. ....	25
General Motors Corp. ....	13, 31	Stulz-Sickles Co. ....	112
Goodall Rubber Co. ....	111	Synton Co. ....	113
Goodrich, R. F., Co. ....	3		
Goodyear Tire & Rubber Co. ....	9	Texas Co. ....	54
Gruendler Crusher & Pulv. Co. ....	168	Thermoid Co. ....	46
Gulf Oil Corp. ....	44	Traylor Engineering & Mfg. Co. ....	7
		Trinity Div. General Portland Cement Co. ....	146
Harnischfeger, P. & H., Corp. ....	23		
Hayward Co. ....	160	Union Wire Rope Corp. ....	112
Heltzel Steel Form & Iron Co. ....	145	U. S. Electrical Motors, Inc. ....	160
Hewitt-Robins, Inc. ....	104	United States Rubber Co. ....	32
Horn, A. C., Co., Inc. ....	135	U. S. Steel Corp. ....	120
		Universal Atlas Cement Co. ....	120
International Harvester Co. ....	8	Universal Vibrating Screen Co. ....	108
Iowa Manufacturing Co. ....	40, 41		
Jaeger Machine Co. ....	115, 139	Vulcan Iron Works .....	42
Johnson, C. S., Co. ....	124, 125		
Joy Manufacturing Co. ....	48, 160	Warsop Power Tools, Inc. ....	108
		Western Machinery Co. ....	30
Kennedy-Van Saun Mfg. & Engr. Corp. ....	12	Wilfley, A. R., & Sons, Inc. ....	160
		Williams Patent Crusher & Pulverizer Co. ....	Inside Front Cover

## INDEX TO CLASSIFIED ADVERTISERS

Business Opportunities	151, 166
Cement Colors	151
Cinders	151
Consulting Engineers	151
Core Drilling	166
Equipment Wanted	151, 166
For Sale	150, 151, 161, 166
Positions Vacant	151, 166
Positions Wanted	151, 166
Services Offered	166

ALSO SEE INDEX OF CONCRETE PRODUCTS SECTION ADVERTISERS  
ON PAGE 152

Airport Sand & Gravel Co.	164
Albert Pipe Supply Co., Inc.	161
Bacon-Pietsch Co., Inc.	164
Baker, Elmer B.	166
Berman Sales Co.	163
Birmingham Rail & Locomotive Co.	162
Black White Limestone Co.	162
Bonded Scale & Machine Co.	165
Brown, Thomas M.	164
Budding, J. C., Co.	166
Bundy Concrete Co.	165
Byers, A. M.	166
Carbon Limestone Co.	163
Carlyle Rubber Co., Inc.	164
Coast Equipment Co.	163
Corson, G. & W. H., Inc.	161, 165
Darien	163
Duncan Bros.	166
Duquesne Slag Products Co.	163
Eighmy Equipment Co.	163
Foster, L. B., Co.	164
Frank, M. K.	163
Gibbs, Ralph E., Engineering	166
Great Lakes Carbon Corp.	166
Halliburton Portland Cement Co.	163
Heat & Power Co., Inc.	164
Heehs, E. D., & Son	164
Heidenreich Jr., E. Lee	166
Hodge & Hammond, Inc.	162
Hornsey, Fred, & Co.	166
Jaeger-Lembo Machine Corp.	163
Johnson & Hoehler, Inc.	162
Kern-Limerick, Inc.	166
Kliebenstein, E. H., Co.	164
Latham Construction Co.	166
Lawrence, Ollie E.	162
McLeod, Alex T.	164
McMindes, R. P., Co.	166
Mid-Continent Equip. Co., Inc.	162
Midwest Steel Corp.	165
Mill & Quarry Equip. Co.	161
Mississippi Valley Equip. Co.	161
Nussbaum, V. M., & Co.	165
O'Neill, A. J.	161
Park, George, Tractor Co.	165
Penn. H. O., Machinery Co., Inc.	162
Pennsylvania Drilling Co.	166
Riverton Lime & Stone Co., Inc.	165
Ruberoid Co.	162
Smith, L. B., Inc.	162
Tractor & Equip. Co.	163
Unverzagt, G. A., & Sons	161
Van Keppel, G. W., Co.	165
Walsh, Richard P.	165
Weiss, B. M., Co.	161
Wayne, Roy C., Supply Co.	161
Wyoming Nat'l Bank of Wilkes Barre, Pa.	165

For Rebuilding All Types of  
Rock Crushing Equipment

Use

**RESISTO-LOY**

and

**MANGATONE N. M.**



**5 BIG SAVINGS**—Increased performance; increased aggregate tonnage; decreased labor cost per ton; decreased maintenance and reduced repair downtime.

**MANGATONE N.M.** (Nickel Manganese) properly applied to any worn manganese steel by the **TWO-TONE** process will give you real performance by increasing life of all crushing equipment at least three times the life of new manganese steel crushing equipment. Provide definite savings by reducing more rock to size in less time and at lower cost per ton than you have ever experienced before. Manganese steel is not damaged by the **TWO-TONE** process. **INVESTIGATE.** We can prove it by hundreds of performances.

**RESISTO-LOY** applied as beads to the points of greatest wear on crusher rolls, crusher plate ribs, crusher mantles and gyratory liners will reduce fines, crush more rock to set sizes, do it quicker and easier than any other wear-resisting material. 15 to 1 increased production.

**RESISTO-LOY WILL NOT CHIP OR BREAK OFF OF MANGATONE N.M.** or for that matter any manganese steel **REGARDLESS OF EXTREMELY HIGH IMPACT.** Let us prove it to you.

**RESISTO-LOY COMPANY**

GRAND RAPIDS 7, MICHIGAN

# FOR LOWER OPERATING COSTS PER HOUR





Feed  
End Ring



Nose Ring



Outlet Grates



12' Feed  
Pipe



Clinker Chain

If your replacement and down-time costs are getting out of hand—investigate Thermalloy for kiln parts.

Thermalloy was developed specifically to take heavy loads and rough usage . . . to resist corrosive gases, excessive heat (up to 2100°F) and abrasion. In scores of kiln installations, Thermalloy has proved it can give longer service—reduce maintenance costs on the job.

Thermalloy is not just one alloy. It's a group of alloys—each developed to meet a specific heat and abrasion problem. An Electro-Alloys engineer can show you how Thermalloy kiln parts can lower your operating costs—assist you in selecting the design best suited to your needs. Call your nearest Electro-Alloys Office, or write Electro-Alloys Division, 2016 Taylor Street, Elyria, Ohio.

\*Reg. U. S. Pat. Off.

**FEED PIPES • CHAIN: CONVEYOR, DRAG • BURNER NOZZLES  
OUTLET GRATES • FEED CHUTES • KILN SHELL SEGMENTS • KILN DAMPERS**

Specify **THERMALLOY\*** for heat and abrasion resistance . . . **CHEMALLOY\*** for corrosion resistance

AMERICAN

**Brake Shoe**

COMPANY

Write for Technical Booklet—Cast 26% CR, 20% NI Alloys

**ELECTRO-ALLOYS DIVISION •**  
ELYRIA, OHIO





USE  
A

## SIMPLICITY D'WATERING WHEEL

Facts prove that a Simplicity D'Watering Wheel is more economical than any other device for dewatering sand and gravel. The D'Watering Wheel is fast and positive in operating . . . eliminates sloppy settling basins and haphazard dipping operations. Only one power unit is required, and there's no maintenance costs to worry about.

The installation shown above is using a Double Deck Simplicity Vibrating screen and a D'Watering wheel for economical sizing, separation and dewatering. Oversize is removed on the screen and the gravel is separated from the sand which drops into the wheel tank. The D'Watering Wheel lifts the sand out of the tank, reduces the moisture content to 12% in the process and deposits the sand on a fast-moving inclined conveyor belt. Simplicity D'Watering Wheels are available in 2' or 3' widths and 14' diameters. Find out more about this economical equipment . . . you'll be money ahead.



SALES REPRESENTATIVES IN ALL PARTS OF THE U. S. A. • FOR CANADA: Canadian Bridge Engineering Co., Ltd., Walkerville, Ontario • FOR EXPORT: Brown & Sites, 50 Church St., New York 7.



SIMPLICITY ENGINEERING COMPANY • DURAND, MICHIGAN

# NO OTHER JAW CRUSHER CAN TOUCH IT!

Look what you get

only in the **KUE-KEN**

- Two to five times greater capacity
- Much less power required per ton crushed
- Completely enclosed lubrication system
- Jaw plates last 5 to 10 times longer

it's  
the action—

**the Free, Balanced Swing of the Jaw Plate  
that "Crushes Without Rubbing"**



**Blake or Double Toggle Crusher**  
(Designed 1858)

Note how swing jaw forces rock upward causing rock to rub against jaws (see arrows). This rubbing action rapidly wears jaw faces, increases the percentage of fines, and reduces capacity of the crusher.



**Dalton Overhead Eccentric or  
Single Toggle Crusher**  
(Designed 1879)

Moving jaw forces rock both up and down (see arrows), causing a rubbing action that not only results in excessive fines, but causes heavy jaw plate wear and wasted power. Bearing pressures on this type are very high.

Here's real efficiency and economy—in (of all things) a *Jaw Crusher*! The massive swing jaw with plate attached swings freely on the large hinge pin "K" as a balanced pendulum. No great weight is lifted on the swing upward as in usual jaw crusher design. This results in substantial power saving and an action that crushes without rubbing, giving less fines and little wear on the jaw plates. Kue-Ken's swing jaw moves squarely against the rock, instantly gripping and crushing without forcing rock upward. Don't turn down a jaw for the job or select any other jaw crusher until you've investigated the Kue-Ken, the improved jaw crusher. Send for Bulletin 5012.

Exclusive eastern manufacturer and distributor, PENNSYLVANIA CRUSHER COMPANY, Division of Bath Iron Works Corporation, 1710 Liberty Trust Bldg., Philadelphia 7, Pa. Exclusive western manufacturer and distributor, STRAUB MFG. CO., 507 Chestnut St., Oakland 7, Calif.

New York • Boston • Pittsburgh • Birmingham • Roanoke •  
Detroit • Chicago • St. Louis • Crosby, Minn. • Los Angeles.  
Associated with Fraser & Chalmers Engineering Works, London.

Manufacturers of • Hammermills • Single Rolls • Bradmills  
• Kue-Ken Jaws • Kue-Ken Gyracones • Granulators •  
Impactors • Bradford Breakers • Send for Bulletin.

**PENNSYLVANIA**  
**CRUSHER COMPANY**